NAVAL PETROLEUM RESERVES

HEARINGS

BEFORE THE

SUBCOMMITTEE ON PREPAREDNESS

OF THE

COMMITTEE ON ARMED SERVICES
UNITED STATES SENATE

NINETY-SEVENTH CONGRESS

FIRST SESSION

ON

S. 1744

TO AUTHORIZE APPROPRIATIONS FOR CONSERVATION, EXPLORATION, DEVELOPMENT, PRODUCTION, SALE, AND USE OF NAVAL PETROLEUM RESERVES AND NAVAL OIL SHALE RESERVES, FOR FISCAL YEAR 1982 AND FOR FISCAL YEAR 1983, AND FOR OTHER PURPOSES

H.R. 3023

TO AUTHORIZE APPROPRIATIONS TO THE DEPARTMENT OF ENERGY FOR FISCAL YEAR 1982 FOR CONSERVATION, EXPLORATION, DEVELOPMENT, PRODUCTION, SALE, AND USE OF THE NAVAL PETROLEUM RESERVES AND NAVAL OIL SHALE RESERVES

NOVEMBER 12, 1981

Printed for the use of the Committee on Armed Services

U.S. GOVERNMENT PRINTING OFFICE
99-914 O WASHINGTON : 1982

S201-37

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NAVAL PETROLEUM RESERVES

THURSDAY, NOVEMBER 12, 1981

U.S. SENATE,
SUBCOMMITTEE ON PREPAREDNESS OF THE
COMMITTEE ON ARMED SERVICES,
Washington, D.C.

The subcommittee met in open session at 10 a.m., in room 212, Russell Senate Office Building, Senator Gordon J. Humphrey (chairman) presiding.

Present: Senator Humphrey.

Staff present: Paul C. Besozzi, minority counsel; David S. Lyles, James C. Smith, professional staff members; Marie Fabrizio Dickinson, staff assistant.

Also present: Madelyn Johnson, assistant to Senator Tower; George Kohl, assistant to Senator Humphrey; and Robert Nichols, assistant to Senator Jackson.

[The bills, S. 1744 and H.R. 3023, follow:]

[S. 1744, 97th Congress, 1st Session]

A BILL To authorize appropriations for conservation, exploration, development, production, sale, and use of naval petroleum reserves and naval oil shale reserves, for fiscal year 1982 and for fiscal year 1983, and for other purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, **That there is authorized to be appropriated to the Department of Energy for fiscal year 1982 for conservation, exploration, development, production, sale, and use of the naval petroleum reserves and the naval oil shale reserves under chapter 641 of title 10, United States Code, the sum of $228,463,000, of which—**

(1) $225,903,000 shall be available for the naval petroleum reserves; and
(2) $2,560,000 shall be available for the naval oil shale reserves.

SEC. 2. There is authorized to be appropriated to the Department of Energy to be available no earlier than October 1, 1982, such sums as may be necessary for fiscal year 1983 for the naval petroleum reserves and naval oil shale reserves.

[H.R. 3023, 97th Congress, 1st Session]

AN ACT To authorize appropriations to the Department of Energy for fiscal year 1982 for conservation, exploration, development, production, sale, and use of the naval petroleum reserves and naval oil shale reserves

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, **That there is authorized to be appropriated to the Department of Energy for fiscal year 1982 for conservation, exploration, development, production, sale, and use of the naval petroleum reserves and the naval oil shale reserves under chapter 641 of title 10, United States Code, the sum of $228,463,000, of which—**

(1) $225,903,000 shall be available for the naval petroleum reserves; and
(2) $2,560,000 shall be available for the naval oil shale reserves.

Passed the House of Representatives June 11, 1981.

Attest:

EDMUND L. HENSHAW, Jr.,
Clerk.
By THOMAS E. LADD,
Assistant to the Clerk.

OPENING STATEMENT BY SENATOR GORDON J. HUMPHREY, CHAIRMAN

Senator HUMPHREY. Good morning.

The purpose of the hearing is threefold: First, the committee has before it two bills—S. 1744 and H.R. 3023—authorizing appropriations for the operations of the Naval Petroleum Reserves for fiscal year 1982.

As required by the Naval Petroleum Reserves Production Act of 1976, the President has forwarded his decision to the Congress to continue production of these reserves for another 3 years. Under the provisions of this same act, the Congress has 90 days in which to review and, if desired, to amend or veto the President's decision.

This record should include the advantages as well as the disadvantages of the President's decision.

The President has also announced his intention to dissolve the Department of Energy. Options with respect to the future management of the Naval Petroleum Reserves need to be examined in this context.

We have asked officials of the Department of Energy and the Department of Defense to present testimony on behalf of the administration and we have scheduled outside witnesses.

Mr. William A. Vaughan, Assistant Secretary of Energy for Environmental Protection, Safety, and Emergency Preparedness, and Capt. Gordon R. Gilmore, Director, Office of the Naval Petroleum and Oil Shale Reserves, will testify first.

Then we will proceed to hear from Mr. Richard D. Webster, Deputy Assistant Secretary of Defense for Logistics and Materiel Management.

Mr. D. T. Magee, vice president of Chevron, will then be heard, since Chevron owns about 22 percent of the Elk Hills field.

Mr. James H. Lopeman, executive director, Independent Refiners Association of California, will speak on behalf of the small refiners in California who would be directly affected by any change in Elk Hills' production.

The record of this hearing will be kept open for 7 days so that anyone who may be interested in this issue can submit written testimony to be considered for inclusion in the public record.

Incidentally, thank you each for doing something that is very rare for witnesses, namely, providing your testimony ahead of time—well ahead of time. I have reviewed it and will have a number of questions for you. Secretary Vaughan, will you proceed?

[The prepared statement of William A. Vaughan follows:]

PREPARED STATEMENT OF WILLIAM A. VAUGHAN, ASSISTANT SECRETARY, ENVIRONMENTAL PROTECTION, SAFETY, AND EMERGENCY PREPAREDNESS, DEPARTMENT OF ENERGY

Mr. Chairman, it is my pleasure to appear before you today in support of the President's decision that the continued production of the Naval Petroleum Reserves (NPR) at the maximum efficient rate is in the national interest. As this committee is well aware, the Naval Petroleum Reserves Production Act of 1976 authorized and mandated the maximum efficient rate production of the NPR for a period not to exceed six years. This authority expires on April 5, 1982. As required by the Act, the President sent his certification and report to the Congress on October 6, 1981. I would like to take this opportunity to provide a copy of this report and the President's certification for insertion in the record.

Before discussing the President's decision, I would like to briefly review the history of the Naval Petroleum Reserves and highlight our recent accomplishments. There are three Naval Petroleum Reserves: two adjoining Reserves in California, and one in Wyoming.

Naval Petroleum Reserve No. 1 (Elk Hills) was set aside in 1912, and is located in the San Joaquin Valley, about 110 miles northwest of Los Angeles and about 30 miles southwest of Bakersfield in Kern County, California. In terms of remaining recoverable reserves, NPR-1 is the fourth largest reserve in the United States with about 970 million barrels still to be recovered. The United States owns approximately 80 percent of the petroleum within NPR-1, while Chevron, U.S.A., Inc., owns the remaining 20 percent. A unitization agreement was entered into by the United States and Chevron (then Standard Oil of California) in 1944, and gave the Government control over the time and rate of production from the unitized lands. Current production of approximately 175,000 barrels of oil per day (BOPD) makes Elk Hills the second largest producing field in the United States behind Prudhoe Bay. In addition, approximately 100 million cubic feet of natural gas per day and over 600,000 gallons per day of liquid products (propane, butane and natural gasoline) are produced and sold by the Department of Energy.

NPR-2 at Buena Vista Hills, California is contiguous to the southwest portion of NPR-1. During the period from 1920–1923, the U.S. Government lands in NPR-2 were leased to private operators pursuant to the 1920 Mineral Leasing Act, and have been produced continuously since that time. Total proven remaining reserves in this field are about 20 million barrels of oil. NPR-2 production during fiscal year 1981 was approximately 2,400 BOPD with the Government's royalty share being under 300 BOPD.

Naval Petroleum Reserve No. 3 (NPR-3), Teapot Dome, was created in 1915 and is completely Government-owned and controlled. This Reserve is located in Natrona County, Wyoming, northeast of Casper, Wyoming. It is estimated that the remaining recoverable reserves at NPR-3 are approximately 26 million barrels of oil. In fiscal year 1981, production from NPR-3 averaged about 3,500 BOPD.

Naval Oil Shale Reserves Nos. 1 and 3 (NOSR-1 and 3) were set aside in 1916 and 1924, respectively, and are located in Garfield County, Colorado. Naval Oil Shale Reserve No. 2 (NOSR-2) was set aside in 1916 and is located in Carbon and Unita Counties, Utah. These Reserves contain an estimated 22 billion barrels of shale of oil in-place (18 billion at NOSR-1 and 4 billion at NOSR-2) of which two to five billion barrels on NOSR-1 are considered to be economically recoverable today. NOSR-3 contains essentially no shale oil and was set aside as a staging area for operations on the contiguous NOSR-1.

Recently, several discoveries of oil and gas deposits by private companies have occurred in the vicinity of NOSR-2 and NOSR-3. As a result, we are in the process of completing geologic (seismic) studies on NOSR-2 to determine if it would be feasible to lease this Reserve for oil and gas exploration. Prior to any lease, however, the law requires consultation with the Senate and House Committees on Armed Services and Presidential approval. We will, of course, keep this Subcommittee informed of all decisions along these lines.

The Naval Petroleum Reserves Production Act of 1976 directed that the NPR's be produced at their maximum efficient rate for an initial period not to exceed six years. Over the past five and a half years we have pursued an aggressive development program which has included 29 exploratory wells, 913 development wells, plus significantly expanded production and processing facilities. The result of this effort has been to raise our daily oil production from an average of approximately 3,000 barrels per day to an average of 180,000 barrels per day, plus associated gas and liquid products. In return for program costs of about $560 million, approximately 260 million barrels of oil have been produced and sold, resulting in revenue receipts to the Treasury of almost $5 billion. This program has enhanced our national security by reducing our dependence on foreign oil, improving our international balance of payments and reducing federal budget deficits.

Captain Gilmore and the staff of the NPR are to be commended for their efforts that have brought about these significant accomplishments.

The decision on the appropriate level of NPR production can be seen as a complex public policy issue. The report to the Congress on NPR production portrays it as such, and I will summarize that report in a moment.

But let me highlight the main conclusions of that report which are really quite simple and straightforward:

1. Continued production of the NPR's makes sound economic sense. It is consistent with our general energy and economic policy of encouraging efficient, low-cost production. NPR production is low-cost as evidenced by the fact that, in return for $560 million spent on the program, we have produced oil worth almost $5 billion to date. Continued production, in addition, reduces imports, im-

proves our balance of payments and reduces the Federal budget deficit. Because continued production is sound economics, it enhances the Nation's strength and security.

2. Continued production of the NPR's makes sound strategic sense. The SPR is much more efficient for dealing with disruptions in petroleum supplies, the SPR is much more efficient than shutting-in the NPR's. With respect to military needs of the Department of Defense, there should be no doubt in anyone's mind that these will be provided for—from the SPR and from other petroleum supplies, using Defense Production Act authorities if necessary. There is no need to shut-in an oil field to provide for Defense needs.

For these reasons—sound economics and sound security considerations—the administration concluded, without hesitation, that continued production is in the Nation's interests.

Returning to the back-up report in more detail, the production alternatives were examined in both strategic and economic terms. The economic analysis examined the issue in terms of the impact of production on world oil prices, the U.S. oil import bill, and Federal budget receipts. The strategic analysis focused on the potential contributions of the Reserves during a near term oil supply interruption.

A decision to shut-in the NPR's would reduce oil production after April 1982 by approximately 130,000 barrels per day over a three-year period. This would result in U.S. consumers paying more to foreign producers for all oil imports, including the increase in imports needed to replace the reduction in NPR output. The President's decision to continue NPR production results in an oil import bill savings of $2.3 billion over the next decade when compared with the three year shut-in alternative. His decision also avoids a $4.5 billion revenue loss to the Treasury between fiscal years 1982 and 1984.

Our analysis revealed that, if a severe supply interruption happened in 1985, shutting-in NPR–1 now would produce greater benefits in the interruption period, although not enough to offset the costs of a shut-in action.

The strategic value of a shut-in of the Naval Petroleum Reserves lies essentially in the capability to call forth increases in domestic production in order to reduce the impacts of a petroleum supply interruption. Depending on the assumptions used the strategic value of shutting-in NPR–1 would result in a net production increase of 50,000 BOPD on an annual basis when compared with continued production at the maximum efficient rate. This surge capability is extremely small when compared with the existing surge capability of the Strategic Petroleum Reserve of about 1.7 million BOPD, which will increase to about 3 million BOPD in 1985.

In this context, it should be noted that it would take between 60–90 days for NPR–1 to reach its full production capability following a shut-in, whereas the SPR can begin almost immediately to drawdown at its full surge capacity. In addition, when weighed against the near term Federal revenue losses which could possibly adversely affect budget revenues available for SPR oil purchases or other national security interests, a decision to shut-in NPR–1 could have undesirable strategic consequences.

In recent years, the NPR production has served as a partial and indirect source of supply for both the SPR and meeting the Department of Defense (DOD) fuel requirements. The recent slack oil market conditions have permitted both the SPR and the Department of Defense to meet some of their supply requirements through open market procurements. However, during tight, but non-emergency, conditions, continued NPR oil production would improve the ability of these Federal agencies to meet their respective petroleum requirements. The Department of Defense has begun vigorous efforts to establish more secure sources of its petroleum products, sources which would be insulated to some degree from periodic oil disruptions. At the request of the Secretary of Defense, beginning December 1, 1981, DOD will receive, paying market prices, up to 34,000 BOPD of NPR production. DOD can use this crude oil for its petroleum product requirements.

It is for these reasons and the other conclusions developed in the report that the President made the determination that the continued full production of NPR–1 is in the national interest.

Because of the large differences in production rates, NPR–1 and NPR–3 were analyzed separately. NPR–3 produces only 3,500 barrels per day, all of which currently goes to the Department of Defense.

This Reserve's strategic value in terms of surge capability is very limited. Considering the findings relative to the larger NPR–1, the limited strategic value of NPR–3, the DOD requirement for NPR–3 production, and the absence of any compelling reasons in favor of shut-in, it was concluded that continued production of NPR-3 at the maximum efficient rate is in the national interest.

Mr. Chairman, we believe that the continued production of the Naval Petroleum Reserves at their maximum efficient rate is clearly in the national interest. In support of this determination I would like to discuss the 1982 fiscal budget that will enable the Department to continue the operations of the Naval Petroleum and Oil Shale Reserves.

FISCAL YEAR 1982 BUDGET REQUEST

A. NPR-1

The fiscal year 1982 budget request for NPR-1 is $202,037,000. These funds are being requested in five categories: (1) Operations and Maintenance ($107,161,000), (2) Development Drilling ($76,528,000), (3) Development Facilities ($7,188,000), (4) Exploration Drilling ($8,119,000), and (5) Program Direction ($3,041,000). The funds requested for Operations and Maintenance represent an approximate increase of $38 million over the fiscal year 1981 request. This increase is due to increased fuel and utilities costs, the need for a greater number of remedial well jobs for a larger number of older wells, major maintenance work, increased operator personnel, and inflation for oil field-related work. In addition, the fiscal year 1982 Development Drilling Program will provide for 91 additional development wells, an increase of 45 over the number of wells drilled in fiscal year 1981. This number may vary slightly as more geological and reservoir data are gathered during the ongoing development program.

The Facilities Development Program will continue during fiscal year 1982. Funds in the amount of $7.188 million are being requested in this category to complete the California Development Program. The work will be essentially completed by the end of the fiscal year at a cost of $361.2 million, $5 million below the current budget estimate.

As a result of interpretations of geological data collected during fiscal year 1981 and prior fiscal years, funds are being requested for the drilling of four exploratory wells in fiscal year 1982. These wells will explore extremely attractive prospects in the Shallow Oil Zone, the Stevens Zone and the Carneros Zone, with emphasis continuing on the 31S Structure and the 26R Channel sand trend. These wells are needed in order to explore the 20 percent of the Reserve presently unexplored.

The request for NPR-1 Program Direction is $3,041,000. This supports 77 full-time equivalent employees and includes salaries, benefits, travel and supplies.

B. NPR-3

The fiscal year 1982 budget request of $22,869,000 for NPR-3 provides funding for operations and maintenance ($13,414,000), and the development program which includes the Enhanced Oil Recovery Program ($8,827,000). It is planned that 27 development wells, including 12 waterflood wells, will be drilled in fiscal year 1982. The pilot EOR program will continue during the year and will result in completion of the pilot drilling and construction. It is estimated that if this pilot project is successful, production at NPR-3 will be substantially increased by the mid-1980's. The Program Direction category provides funds for the salaries, benefits, travel and supplies for 17 full-time equivalent employees ($628,000).

C. Naval oil shale reserves

The fiscal year 1982 budget request for the Naval Oil Shale Reserves is $2,560,000. With funding at the requested level in fiscal year 1982, the Predevelopment Plan can be completed in mid-fiscal year 1982.

D. Headquarters

The amount requested for Headquarters funding is for the salaries, benefits and travel for 26 full-time equivalent employees ($997,000). The Headquarters element provides overall direction, management, and coordination for the program including planning, fiduciary, and technical responsibilities.

HEALTH OF THE PROGRAM

In summary, the various reservoirs at NPR-1 are performing essentially as planned, and production is within the predicted range. The California Development Program is 85 percent complete and will be essentially completed by the end of fiscal year 1982. At NPR-3, the primary development drilling and facilities programs are also nearing completion. Construction of two enhanced oil recovery projects at NPR-3 are underway for the purpose of increasing production and reserves. The Predevelopment Plan for NOSR-1 will be completed on schedule in fiscal year 1982, and the Reserve could be ready to contribute to the Nation's energy supply by 1990.

I would be pleased to answer any questions you might have.

FISCAL YEAR 1982 CONGRESSIONAL BUDGET REQUEST

[In thousands of dollars]

	Budget authority	Budget outlays
Naval Petroleum Reserves Nos. 1 and 2:		
Operations and maintenance	107,161	101,802
Development drilling	76,528	74,997
Development facilities	7,188	56,727
Exploration	8,119	7,957
Program direction	3,041	3,038
Subtotal	202,037	244,521
Naval Petroleum Reserve No. 3:		
Operations and maintenance	13,414	12,532
Enhanced oil recovery	3,627	3,722
Development program	5,200	5,332
Program direction	628	625
Subtotal	22,869	22,211
Headquarters: Program direction	997	997
Total, naval petroleum reserves	225,903	267,729
Naval oil shale reserves: Development operating expenses	2,560	2,100

SELECTED STATISTICAL DATA

	Fiscal year—		
	1980 actual	1981 actual	1982 estimated
NPR-1			
Production:			
Oil (MBOPD)	159.2	171.4	189.3
Liquid products (MGAL/PD)	365.0	506.1	570.2
Gas (MMCFPD)	209.6	277.4	327.4
Revenue (millions):			
Oil	[1] $1,437.2	$1,430.5	[1] $2,183.6
Liquid products	$47.0	$82.0	$148.0
Gas	$5.6	$61.5	$77.6
Total	$1,489.8	$1,574.0	$2,409.2
Wells:			
Drilled (annual)	65	49	95
Cumulative (all sources)	2,006	2,269	2,151
Producible	1,257	1,124	1,402
Average wells on production	1,025	1,043	1,100
NPR-3			
Production:			
Oil (MBOPD)	4.5	3.4	4.1
Gas (MMCFPD)	4.9	7.7	2.0
Liquid (MGAL/PD)		16.1	17.7
Revenue (millions):			
Oil	[1] $67.5	[1] $44.9	[1] $63.3
Liquid products	$.7	$2.3	$3.5
Gas		$.1	$2.0
Total	$68.2	$47.3	$68.8
Wells:			
Drilled (annual)	57	22	12
Cumulative (all sources)	659	679	675
Producible	458	454	475
Average wells on production	433	439	449

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[1] Includes windfall profit tax.

STATEMENT OF WILLIAM A. VAUGHAN, ASSISTANT SECRETARY, ENVIRONMENTAL PROTECTION, SAFETY, AND EMERGENCY PREPAREDNESS, DEPARTMENT OF ENERGY, ACCOMPANIED BY CAPT. GORDON R. GILMORE, CEC, USN, DIRECTOR, NAVAL PETROLEUM AND OIL SHALE RESERVES

Mr. VAUGHAN. Mr. Chairman, I would propose, if it suits your pleasure, that I simply try to briefly summarize my testimony and have the full text filed for the record. That way, I think, we could get to your questions more efficiently.

Senator HUMPHREY. All right.

Mr. VAUGHAN. It is a pleasure, Mr. Chairman, to be here to explain and support the President's decision that the continued production of the Naval Petroleum Reserves at the maximum efficient rate is in the national interest.

As you so aptly stated a few moments ago, the purpose of this proceeding is to explore that decision on behalf of the President and the administration to determine what action, if any, the Congress should take. It is our purpose to present, as we have over on the House side and now the Senate side, the decision of the administration and the President on this matter and to explain it to you and answer your questions.

Basically, the standard that we were required, or the President was required, to meet was to make a determination under the Naval Petroleum Reserves Production Act of 1976 that the decision to continue production at the maximum efficient rate was in the national interest.

In making that decision, the President balanced two admittedly competing interests. He balanced the strategic considerations against those of the general energy policy and financial considerations. Making that balance, he determined or reached the conclusion that continued production at the maximum efficient rate for another 3 years was in the national interest.

I have with me, and will file for the record, the formal Presidential letter to the Congress, transmitting the report which was prepared in my department supporting this decision and explaining its rationale.

I would like to go right to what I consider the very meat of this decision on the President's part and quickly summarize that for you, and then respond very briefly on this budgetary matter that you brought up in your opening remarks.

Simply put, the main conclusions in the report that I have just referred to are quite simple and straightforward.

First, continued production of the NPR makes sound economic sense. It is consistent with the Nation's general energy and economic policy of encouraging efficient, low-cost production.

That NPR production is low cost is evidenced by the fact that in return for $560 million spent on the program, we have produced oil worth approximately $5 billion to date. Continued production, in addition, reduces imports, improves the balance of payments, and reduces the Federal budget deficit.

Because continued production is sound economics, it enhances the Nation's strength and security. I would like to emphasize that the Nation's economy and its strength is an important ingredient to its general security capability.

Second, continued production of the NPR makes sound strategic sense. The Strategic Petroleum Reserve, which also reports to me, is a much more efficient tool or device for dealing with disruption in petroleum supplies. The SPR provides a much more efficient emergency petroleum supply than the shutting in of NPR's.

With respect to the military needs of the Department of Defense, there should be no doubt in anyone's mind that these will be provided for from the SPR, from the NPR, from whatever sources we have to tap in order to meet those needs, using the Defense Production Act and whatever other tools are available to us.

In short, from a strategic point of view there is no need to shut in an oil field to provide for defense needs.

That, in essence, is the balancing that the President did in order to reach this decision.

[The Presidential letter to the Congress and the Department of Energy report follows:]

To the Congress of the United States:

In accordance with section 7422(c) of the Naval Petroleum Reserves Production Act of 1976 (10 U.S.C. 7422(c)), I wish to inform you of my decision to extend the period of maximum efficient rate production of the naval petroleum reserves for a period of three years from April 4, 1982, the expiration of the current statutorily mandated period of production.

I am transmitting herewith a copy of the report investigating the necessity of continued production of the reserves as required by section 7422(c)(2)(B) of the Naval Petroleum Reserves Protection Act of 1976. In light of the findings contained in that report, I hereby certify that continued production from the naval petroleum reserves is in the national interest.

RONALD REAGAN.

THE WHITE HOUSE,
October 6, 1981.

9

REPORT ON NAVAL PETROLEUM RESERVES PRODUCTION

Summary

The President must determine and report to the Congress by October 6, 1981, whether production should continue after April 4, 1982, from the Naval Petroleum Reserves at a maximum efficient rate, or whether production should be shut-down to the minimum level necessary for proper reservoir management.

The Naval Petroleum and Oil Shale Reserves were established early in this century, primarily as an emergency source of petroleum for the military. The Naval Petroleum Reserves Act of 1976 expanded the mission of the Reserves to provide for "... essential defense, industrial and military emergency energy requirements relative to the national safety, welfare and economy, resulting from foreign military or economic actions." This Act placed the NPR in full production for six years to self-fund their full development. The Naval Petroleum Reserves are now essentially developed and are presently producing approximately 180,000 barrels per day plus associated gas and liquid products.

A decision to shut-in rather than continue at full production would reduce NPR production to approximately 25,500 barrels per day to manage the reservoirs properly, to meet contractual commitments, and to permit a rapid return to full production.

There are two NPR's involved in this issue. Naval Petroleum Reserve No. 1 (NPR-1) at Elk Hills, California, and Naval Petroleum Reserve No. 3 (NPR-3) at Teapot Dome, Wyoming. Naval Petroleum Reserve No. 2 (NPR-2) at Buena Vista, California has been leased and produced continuously since 1921. The Act has no effect on leases and therefore a decision on continued production from NPR-2 is not required.

This report examines NPR production alternatives in both strategic and economic terms. The economic analysis examined impacts on world oil prices, the U.S. oil import bill, and Federal budget receipts. The strategic analysis focused on the contribution the Naval Petroleum Reserves could make to reducing our vulnerability during a petroleum supply interruption.

Because of the large differences in production rates, NPR-1 and NPR-3 were analyzed separately and are discussed separately in this report.

Naval Petroleum Reserve No. 1

The economic analysis revealed that a decision to shut-in NPR production would put upward pressure on world oil prices, increase the U.S. oil import bill, and reduce Federal budget receipts. A decision to shut-in NPR-1 would reduce production after April 1982 by an average of approximately 130,000 barrels per day over a three-year period. This would tend to put upward pressure on world oil prices due to the increased demand for foreign oil. Domestic consumers would pay more to foreign producers for all oil imports, including the increase in imports needed to replace the reduction in NPR output with foreign oil. Department of Energy calculations indicate that the shut-in alternative would result in increases in the oil import bill of approximately $2 billion per year during the 1982-1984 period.

While these near-term oil import bill increases under the shut-in alternatives are offset in part in future years, the continued production alternative results in oil import bill savings of $2.3 billion over the next decade on a present value basis compared to a three-year shut-in. DOE estimates that total revenue loss to the Treasury would be $4.5 billion in the 1982-1984 period.

If we postulate a severe supply interruption happening in 1985, shutting-in NPR-1 now would produce greater benefits in the post-interruption period, although not enough to offset the pre-interruption costs of the shut-in policy.

The strategic value of a Naval Petroleum Reserve lies essentially in its capability to call forth increases in domestic production to reduce our vulnerability to a petroleum supply interruption. Depending on assumptions used, the strategic value of NPR-1 shut-in in terms of net surge capability is estimated to be approximately 50,000 barrels per day in 1985 if the NPR-1 is shut-in for the three prior years. This surge capability is extremely small when compared with the surge capability of the Strategic Petroleum Reserve of about 1.7 million barrels today and increasing to about 3 million barrels in 1985. In addition, when weighed against the near-term Federal revenue losses which could possibly adversely affect budget revenues available for SPR oil purchases, a decision to shut-in NPR-1 could have adverse strategic consequences.

In recent years NPR-1 served as a partial and indirect source of supply for both the SPR and meeting Department of Defense fuel requirements. While 1981 slack oil market conditions have permitted both the SPR and the Department of Defense to meet their supply requirements substantially through open market procurements, during tight (but non-emergency) conditions, it is very possible that continued NPR-1 oil production would improve the ability of these Federal agencies to meet their respective petroleum requirements. The Secretary of Defense has begun vigorous efforts to establish more secure sources of petroleum products for DOD which would be insulated to some degree from periodic oil disruptions. At the request of the

Secretary of Defense, beginning on December 1, 1981, DOD will receive, paying market prices, 34,000 barrels per day of NPR production, and it is anticipated that this will increase to about 120,000 barrels per day on April 5, 1982. DOD will exchange the NPR crude oil for its petroleum product requirements.

Based on this analysis, we have concluded that continued production from the NPR-1 is in the national interest. The potential benefits of shutting-in NPR-1 for production at surge levels during an oil supply interruption to supplement the drawdown of the Strategic Petroleum Reserve are not cost effective. Department of Energy analysis indicates that the costs of shut-in -- deferring Federal budget receipts and increasing the U.S. Oil Import Bill -- would outweigh such benefits even if it were certain that a world oil supply interruption of 6 million barrels per day would occur for the full calendar year 1985. The shut-in option would tend to increase U.S. dependence on foreign oil and increase world oil prices. Other considerations are that the Department of Defense will be using a portion of NPR-1 production to meet its fuel requirements and that there would be more cost effective ways of preparing for the hypothetical oil supply interruption.

Naval Petroleum Reserve No. 3

NPR-3 produces only 3,500 barrels per day, all of which goes to the Department of Defense to exchange for refined products. Its strategic value in terms of surge capability is very limited. Considering the findings relative to the larger NPR-1, the limited strategic value of NPR-3, DOD requirement for NPR-3 production, and the absence of any compelling reasons in favor of shut-in, we have concluded that continued production of NPR-3 at the maximum efficient rate is in the national interest.

EFFECTS ON THE NATIONAL INTEREST OF ALTERNATIVE NAVAL PETROLEUM RESERVE PRODUCTION LEVELS

Introduction

This paper assesses the effects on the National interest of decisions to continue production of Naval Petroleum Reserves Number #1 (Elk Hills, California) and Number #3 (Teapot Dome, Wyoming) at their respective maximum efficient rates of production (MER).

The analysis centers on Naval Petroleum Reserve Number #1 (NPR-1) which is currently producing 175 thousand barrels per day (MBD). Naval Petroleum Reserve #3 (NPR-3) is currently producing 3,400 barrels per day and is addressed in a separate section below.

For NPR-1, two alternative production policies were defined for purposes of this analysis:

(1) Continued MER: Continued production of NPR-1 at maximum efficient rates through the year 2000.

(2) Shut-In: Production of NPR-1 at 25 MBD for the period April 5, 1982 through April 4, 1985, with surge production resuming for the period April 5, 1985 through April 4, 1986 and thereafter continued production through the year 2000 at the MER. The timing of the resumption of full NPR-1 production in 1985 was assumed because the Strategic Petroleum Reserve will have increased to over 400 MMB by that year.

Attachment #1 presents these two alternatives in more detail.

Dimensions of the National Interest

A variety of National economic and strategic variables would be affected by the choice between these two policy alternatives as follows:

- World Oil Prices
- U.S. Oil Import Levels
- Economic Effects
- Federal Budget Receipts
- Mitigation of the Effects of an Oil Supply Interruption

Subsequent sections of this paper describe the directional effects on these variables of decisions among NPR-1 production policy alternatives and provide estimates of the quantitative values of these effects. The first four National interest dimensions are examined assuming that no oil supply interruption occurs and are then reexamined assuming that an oil supply disruption does occur in the 1985 time-frame.

Base Case Assumptions

The choice between the two production policies affects when the crude oil is produced from NPR-1, not how much oil is ultimately recovered. However, during the period analyzed in this paper (1981-2000) there are slight differences in the total level of oil production. The economic analysis of the alternatives is thus heavily dependent on projections over time of the changes in oil value. From 1978 to 1980 there were significant increases in world oil prices, but prices have fallen since 1980. This recent history serves to illustrate the uncertainties inherent in long-range oil price projections.

For purposes of this analysis, it was assumed that world oil prices stabilize for the remainder of 1981, increase during 1982 at the rate of inflation as expressed by the GNP deflator, and increase by 3% per year in real terms in 1983 and future years. Attachment #2 describes these assumptions in more detail.

NATIONAL INTEREST EFFECTS IF NO SUPPLY DISRUPTION OCCURS

World Oil Prices

Selection of the Shut-In policy over the Continued MER policy would reduce NPR-1 production during the April 1982 to December 1984 period by approximately 130 MMB, an average of approximately 130 MBD for the entire period. This would tend to put upward pressure on world oil prices during this period because of the increased demand for foreign oil. Upon resumption of NPR-1 production in 1985 at higher rates than under Continued MER policies, these price effects would be reversed in direction for the remainder of the decade.

The calculated effects of the Shut-In policy compared to the Base Case which incorporates the Continued MER policy are presented in Attachment #3. Briefly, the Shut-In case is estimated to increase world oil prices in 1981 dollars by $.16 per barrel in 1982, $.33 per barrel in 1983, $.48 per barrel in 1984, and $.49 per barrel in 1985. Beyond 1985 the Shut-In case is estimated to reduce world oil prices by up to $.43 per barrel over the remainder of the decade.

These calculated effects tend to be within the uncertainty range of the economic models used and should be considered to be highly uncertain. Nevertheless, Attachment #3 represents an objective assessment of the magnitude of the directional effects of the Shut-In option.

U.S. Oil Imports

The Continued MER policy will avoid the increases in the 1982 - 1984 period in U.S. oil imports which would be associated with the Shut-In policy, and hence avoid the economic and strategic costs of increased reliance on foreign oil in this time period. The Shut-In policy would reduce U.S. domestic oil production in the near-term with compensating increases after NPR-1 production is resumed at higher levels in 1985.

Attachment #4 describes the projected effects on U.S. oil import levels from selecting the Shut-In policy over the Continued MER policy. During the 1982 - 1984 period, U.S. oil imports would increase under the Shut-In policy by an average of 100 MBD or about 1.5 percent over the base case with a Continued MER policy. From 1985 through 1990, the Shut-In policy would reduce U.S. oil imports by an average of less than 40 MBD.

Economic Effects

As discussed above, a decision to shut in NPR production rather than to continue production at the MER will result in higher U.S. oil imports and higher world oil prices in the near-term.

The most significant economic cost of lower NPR production at any given time will be the transfer of wealth from U.S. consumers to foreign oil producers, termed the "U.S. Oil Import Bill." Domestic consumers will pay more to foreign producers for all oil imports following the price increase induced by lower NPR production under the Shut-In policy. In addition, consumers will pay the full world price on the increase in imports needed to replace the reduction in NPR-1 output under the Shut-In policy with foreign oil. There will be little or no savings in NPR-1 costs for exploration and development since these activities will continue at the same pace under both production alternatives.

Attachment #5 presents the annual and cumulative discounted wealth transfer from U.S. consumers to foreign producers (the Oil Import Bill) of the Shut-In and MER production alternatives. These calculations indicate that the Continued MER policy will avoid increases in the Oil Import Bill due to the Shut-In alternative of approximately $2 billion per year during the 1982-1984 period. While these near-term Oil Import Bill increases under the Shut-In case are offset in part in future years, on a present value basis, the Continued MER policy results in Oil Import Bill savings of $2.3 billion over the next decade. It should be noted that there is not projected to be a complete correspondence between the reduced NPR-1 production under the Shut-In case and the increase in U.S. oil imports, because the higher prices attributed to the Shut-In policy slightly reduce U.S. consumption, hence demand for oil imports.

Any increase in oil prices will also result in larger wealth transfers from U.S. consumers to domestic producers, and the Government (e.g., higher Windfall Profit Tax revenues). The additional revenues received by domestic producers and the Government when prices rise will not impose a direct economic cost on the U.S.. Such transfers within the U.S. economy will be recycled quickly and, thus, will not detract from domestic economic activity. Therefore, the analysis does not consider these transfers as an added cost of shut-in production or of maintaining production at the MER. Higher prices will also result in a deadweight loss of consumer surplus. This loss represents the reduced amount of oil consumers can afford to purchase due to a price increase. Since the magnitude of these losses are small, they have not been calculated for purposes of the analysis.

Federal Budget Receipts

Under the present NPR-1 production policy and the proposed Continued MER policy, the Federal Government's share of NPR-1 production is sold to private refiners either directly through competitive sales or indirectly through exchange arrangements effected with the Strategic Petroleum Reserve or the Department of Defense. A portion of the payments for NPR-1 oil is accounted for as a Windfall Profit Tax receipt on the revenue side of the Federal Budget; the remainder is classified as an offsetting proprietory receipt -- a negative entry on the expenditure side of the Federal Budget. The distinction is a matter of accounting; the key matter for consideration is that if NPR-1 production is not maintained at the Continued MER policy level, then there will be a worsening of the Federal Budget deficit situation through the time when, under the Shut-In policy, full NPR-1 production is resumed. Thus the Shut-In policy would, in the near-term, require some combination of further Federal Budget cutbacks, Federal tax increases, or increased Federal borrowing. These adverse effects would be avoided by the Continued MER policy.

Attachment #6 describes these effects in more detail. In summary, Federal Budget deficit increases in 1981 dollars avoided by the Continued MER policy would amount to $.9 billion in FY 1982, $1.6 billion in FY 1983, and $1.3 billion in FY 1984. Including the effects of inflation, the revenue loss would approximate $4.5 billion over this period. After NPR-1 production is resumed under the Shut-In policy, there are some offsetting increases in Federal receipts through the end of the decade of approximately $.3 billion per year in 1981 dollars.

As with the analysis above on the oil import bill, one way of summarizing these impacts over time is through present value analysis of the alternative revenue streams using a 10 percent discount rate on real 1981 dollars. As Attachment #6 also indicates, the Continued MER policy avoids a present value loss from delaying NPR-1 revenues of $1.9 billion or about 10 percent in comparison to the Shut-In policy.

NATIONAL INTEREST EFFECTS IF AN OIL SUPPLY INTERRUPTION OCCURS

Mitigation of the Effects of an Oil Supply Interruption

A major interruption in world oil supplies would have the effect of increasing world oil prices and decreasing the real economic resources available for supporting the U.S. economy. Unemployment and inflation would increase with adverse effects on U.S. investment and productivity. Virtually all measures of U.S. well-being would worsen. Less measurable but equally important aspects of National security and U.S. foreign policy would also be threatened.

One priority of this Administration is to ensure the Nation's energy security through increasing oil stockpiles, the use of which can mitigate a portion of the adverse effects of an oil supply interruption. Substantial progress has been made during 1981 in increasing the size of the Strategic Petroleum Reserve, the Federal Government's primary emergency oil stockpile.

At the present time, the Strategic Petroleum Reserve has approximately 200 million barrels in storage with a planned storage level of 428 million barrels by the end of calendar year 1984.

The Shut-In policy offers one potential advantage over the Continued MER policy: the capability to bring NPR-1 production back on line during an oil supply interruption to increase U.S. domestic supplies over the level associated with the Continued MER policy. While the Shut-In policy would increase U.S. dependence on foreign oil before NPR-1 production is resumed at full rates, the Shut-In policy also effectively defers the natural decline rate in NPR-1 production rates during the shut-in, permitting higher rates of production in the mid-1980's than under the Continued MER policy.

There is a great deal of uncertainty involved in quantifying the potential benefits of the Shut-In policy if a disruption occurs which would not be achieved by the Continued MER policy. In addition to the widely recognized uncertainties regarding the timing, level, duration, and market effects of major oil supply disruption, there are also uncertainties regarding the impact of the Shut-In policy itself on these factors. For instance, the Shut-In policy increases U.S. oil imports during normal periods, possibly resulting in a decrease in unused oil production potential of exporting nations during such normal periods. While resumption of NPR-1 production during an oil supply interruption would increase U.S. domestic production over the predisruption level, the ability of other producers to increase production over higher predisruption levels to offset the supply shortage would have been marginally worsened.

These factors taken together suggest the need for caution in assessing the possible quantitative benefits of the Shut-In option as, in effect, costs of selecting the Continued MER production policy.

To analyze the strategic value of the Shut-In policy, the following scenario was examined:

- As of January 1, 1985, world oil production (except NPR-1) declines by 6 MMBD below the average production level of 1984 and continues at the lower rate for a full twelve months. This shortfall is net of compensating actions which might be taken by oil exporting nations.
- Market forces distribute the impacts of this shortfall among consuming nations.
- If the Continued MER policy is followed, the NPR-1 "surge" to offset the shortfall is limited to a 15 percent increase above the MER production level for the first calendar quarter of the interruption.
- If the Shut-In option is selected, sufficient advance warning of an interruption is provided to enable the Government to resume NPR-1 production in the fourth quarter of calendar 1984, permitting attainment of full "surge" levels during the first calendar quarter of 1985.
- For calendar year 1985, 100 MBD in U.S. imports planned for the Strategic Petroleum Reserve are curtailed, essentially the entire SPR fill rate planned for that year.
- The President decides to draw down the SPR at an average daily rate of 625 MBD for all of 1985, resulting in a drawdown of all but 200 MMB of the 428 MMB SPR inventory at the end of 1984. This 200 MMB is withheld to meet vital National needs in the event the supply shortage worsens or another shortage occurs before the SPR can be refilled.

Attachment #7 provides more information regarding the surge production levels during an interruption of the two NPR-1 production policies. During a calendar year 1985 interruption, the Shut-In alternative increases NPR-1 production by 18.5 MMB or 35 percent over the Continued MER policy. Attachment #8 presents a detailed analysis of the relative effects of the two NPR-1 production policies on the ability of the United States to withstand such an interruption. These effects can be summarized as follows:

World Oil Prices (Interruption)

Under this hypothetical scenario, with Continued MER production, world oil prices would increase to $77.38 per barrel (1981 dollars) during 1985 or up to $38.88 per barrel (101 percent) over the base case with no interruption. With the Shut-In policy, world oil prices would reach $75.27 per barrel during the 1985 interruption or $2.11 per barrel less than under Continued

MER production. Thus if an interruption occurs in 1985, a benefit of the Shut-In case would be to reduce the rise in world oil prices by up to $2.11 per barrel in comparison to the Continued MER case. This benefit diminishes rapidly after the end of the interruption.

U.S. Oil Supply Levels (Interruption)

The 1985 base case with no interruption assumes that 16 MMBD is available to the United States in 1985, of which 9.3 MMBD is from domestic sources and 6.6 MMBD is from imported oil.

With Continued MER production, but with the 1985 interruption, 14.42 MMBD would remain available for U.S. consumption, of which 9.96 MMBD is from domestic sources including the SPR drawdown of 625 MBD, and 4.46 MMBD is from oil imports. Under the Shut-In option, during a 1985 interruption, 14.45 MMBD in oil supplies are available to the United States of which 10.01 MMBD is from domestic sources and 4.44 MMBD is from continuing oil imports.

Thus the Shut-In option increases by a net of 30 MBD the U.S. oil supplies available at market prices during a 1985 oil supply interruption. This consists of the increase in NPR-1 production of 50 MBD over the Continued MER case, less a reduction of 20 MBD in U.S. oil imports under a market allocation approach.

U.S. Oil Import Bill (Interruption)

An oil supply interruption means that the United States pays more for less oil. During the 1985 oil interruption scenario, with Continued MER production, the U.S. annual oil import bill would increase by 35 percent from the 1985 base case level of $93.55 billion (1981 dollars) to $125.95 billion. If, however, the Shut-In policy had been selected, the 1985 oil import bill during the interruption would be approximately $122.02 billion, a reduction of $3.93 billion or 3 percent from the level in the Continued MER case. However, as noted earlier, the Continued MER policy would result in lower predisruption (1982 - 1984) annual U.S. oil import bills. Overall, if an interruption is certain to occur in 1985 the present value in 1981 of the future U.S. oil import bills through 1991 would be $1.39 billion lower under the Continued MER case than under the Shut-In case, notwithstanding the benefits of the Shut-In case during the interruption period itself.

Federal Budget Receipts (Interruption)

Under the Shut-In alternative, if an oil supply interruption occurs during 1985, NPR-1 oil production in FY 1985 would be 70 MMB, as compared to 53.5 MMB with Continued MER production, a difference of 16.5 MMB, increasing Federal receipts from the NPR by $1 billion for FY 1985 in 1981 dollars. This partially offsets the revenue losses of the Shut-In alternative during non-disruption years. Overall, if a disruption is certain to occur, the Continued MER policy results in a present value savings of $1.1 billion from the Shut-In policy, as opposed to present value savings noted above of $1.9 billion if no interruption occurs.

Other Aspects of Energy Security

The Naval Petroleum Reserves oil production has in recent years served as a partial and indirect source of supply for both the filling of the Strategic Petroleum Reserve and for meeting Department of Defense fuel requirements. While 1981 slack oil market conditions have permitted both the Strategic Petroleum Reserve and the Department of Defense to meet their supply requirements substantially through open market procurements, during tight but non-emergency conditions it is possible that trading NPR-1 crude oil production would improve the ability of these Federal agencies to meet their respective needs. This tends to argue for the Continued MER production policy and against Shut-In.

During a major oil supply emergency, the responses of the SPR and the Department of Defense would be substantially different and unrelated to NPR-1 production levels. Filling of the SPR would likely cease to permit imports for the SPR to be diverted to current consumption. Preparations would be made to drawdown the SPR inventory.

For the Department of Defense, there would be an effort to reduce discretionary oil use while preparations were being made to secure supplies for use in military actions which might be associated with the problems which caused the oil supply interruption.

Two major alternatives are available to meet increased fuel requirements for defense purposes. First, the current Distribution Plan of the Strategic Petroleum Reserve provides the option of selling SPR oil in part to refiners which provide fuel supplies to the Department of Defense. Second, under the Defense Production Act there are authorities which permit the Defense Department to have priority access to refinery output.

Therefore, while a supply interruption reduces overall National petroleum supplies, more efficient methods exist for meeting specific military fuel requirements than the NPR-1 Shut-In policy.

Conclusions Regarding NPR-1 (Elk Hills, California) Production Policy Alternatives

From the foregoing analysis we conclude that Continued MER production of NPR-1 is in the National interest. Even if it were certain that a 1985 world supply interruption of 6 MMBD for an entire year will occur, the benefits of the Shut-In option during and following the interruption would not offset the pre-interruption costs, including both the increases in the U.S. Oil Import Bill and the increases in the Federal deficit.

With 100 percent certainty of a 1985 oil supply interruption, the Shut-In case incurs a loss of $1.1 billion in the present value of Federal revenues and a $1.39 billion increase in the present value of the U.S. Oil Import Bill. If no supply interruption occurs, the Shut-In case incurs even higher losses: a $1.9 billion loss in present value of Federal revenues and a $2.30 billion increase in the present value of the U.S. Oil Import Bill.

Therefore, using the expected value criterion and a high assumed probability of 50 percent of an oil supply interruption in 1985, there would be an expected loss to the Shut-In policy of $1.5 billion in the present value of Federal revenues, and an expected increase in the present value of the U.S. Oil Import Bill of $1.8 billion. In either dimension of National interest and under all probability assumptions for the hypothetical supply interruption, the Continued MER policy is preferred.

It could be argued that an even more severe oil supply interruption, assumed to occur in 1985, would make the Shut-In policy even more attractive relative to the Continued MER policy. However, such a risk assessment would have to be viewed in the context of other measures which the United States could take to prepare for such an eventuality, in comparison to the cost-effectiveness of the Shut-In alternative. Shutting in 130 million barrels over a three year period to increase U.S. domestic supply by 50 MBD or 18.5 MMB for a year is not as cost-effective as the public and private sector oil inventory build-up which would occur if there were 100 percent certainty of a severe oil supply interruption in 1985.

Naval Petroleum Reserve Number 3, Teapot Dome, Wyoming (NPR-3)

Naval Petroleum Reserve Number 3 (NPR-3) produces 3,400 barrels of oil per day and has remaining recoverable reserves of about 26 million barrels of crude oil. An enhanced oil recovery effort is now in progress at NPR-3, and NPR-3 crude oil production is now being acquired by the Department of Defense to exchange for refined products.

Given the limited strategic value of NPR-3 because of its size and location, and considering the findings relative to the larger NPR-1, it is concluded that continued production of NPR-3 at the MER is in the National interest.

NPR-1 PRODUCTION

Attachment 1

The Naval Petroleum Reserve (NPR-1) at Elk Hills, California, currently produces 180,000 barrels of crude oil per day (BOPD) and 320 million cubic feet per day of natural gas. It is a "giant" field with remaining recoverable hydrocarbon reserves of more than 1.25 billion barrels oil equivalent, and a production capacity in the United States second only to Prudhoe Bay in Alaska.

Although established in 1912, and produced for a short time in the 1920's and during World War II, full development of the field was not initiated until 1974. Production of the field at its maximum efficient rate of recovery was mandated by the Naval Petroleum Reserves Production Act of 1976 (P.L. 94-258).

As a result of its full development and continuous production at the maximum efficient rate since 1976, the oil recovery rate is expected to peak in early FY 1982 at near 190,000 BOPD. If production is continued, the maximum efficient recovery rate will steadily decline following the characteristic of all oil fields. That decline is reflected in the following table.

The following table indicates 2 production profiles: one showing estimated production of the field should oil recovery continue at the maximum efficient rate, the other showing estimated recovery if production were to be reduced to 25,000 BOPD for 3 years from April 1982 to April 1985.

NPR-1 Production: 1982-2000
(Barrels in Millions)

	Continued MER Production	Production Based on Temporary Shut-in (25,000 BOPD) April 1982 - April 1985
FY 1982	60.7	35.0
FY 1983	57.3	9.1
FY 1984	54.9	9.1
FY 1985	51.8	57.9
FY 1986	46.8	55.0
FY 1987	41.5	49.6
FY 1988	37.4	44.5
FY 1989	33.6	40.1
FY 1990	30.3	36.0
FY 1991	27.2	32.4
FY 1992	24.5	29.2
FY 1993	22.2	26.3
FY 1994	19.8	23.7
FY 1995	17.9	21.3
FY 1996	16.1	19.2
FY 1997	14.5	17.2
FY 1998	13.0	15.5
FY 1999	11.7	14.0
FY 2000	10.5	12.5
Total, 1982 - 2000	591.7	547.6

Attachment 2

Base Case Assumptions

	Calendar Year				
	1981	1985	1990	1995	2000
World Oil Price[a] (1981 Dollars CIF)	$37.79	$38.65	$44.80	$51.94	$60.21
Domestic Production[b] (MMBD)	10.7	9.3	9.4	10.2	
Free World Consumption[b] (MMBD)	47.5	48.1	52.7	58.2	
U.S. Consumption[c] (MMBD)	17.2	16.0	16.3	15.9	
Net U.S. Imports[d] (MMBD)	6.5	6.6	6.9	5.7	

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[a] Source is EIA Short-Term Energy Outlook through 1982 and three percent annual real growth thereafter.

[b] Includes crude oil, natural gas liquids, refinery gains, shale, tar sands and synthetics.

[c] Includes consumption in U.S. territories and purchases for the Strategic Petroleum Reserve.

[d] Includes net imports of all petroleum to the U.S. Balance of Payment area including purchases for the Strategic Petroleum Reserve.

Attachment 3

Estimated Impact on World Oil Prices
(Dollars per Barrel)

Calendar Year	Continued MER Case	Shut-In Case	Difference
1981	$37.79	$37.79	0
1982	35.74	35.90	$.16
1983	36.43	36.76	.33
1984	37.52	38.00	.48
1985	38.65	39.14	.49
1986	39.81	39.77	-.04
1987	41.00	40.68	-.32
1988	42.23	41.80	-.43
1989	43.50	43.11	-.39
1990	44.80	44.54	-.26
1991	46.15	46.04	-.11
1992	47.53	47.55	.02
1993	48.96	49.06	.10
1994	50.43	50.55	.12
1995	51.94	52.05	.11
2000	60.21	NA	NA

NA = Not available.
Note: All prices are expressed in real 1981 dollars for the average barrel of crude oil delivered to the United States.

Attachment 4

Estimated Impact on Oil Import Levels
(million barrels per day)

Calendar Year	Continued MER Case	Shut-In Case	Difference
1981	6.51	6.51	0
1982	7.04	7.14	.10
1983	6.95	7.06	.11
1984	6.84	6.94	.10
1985	6.63	6.54	-.09
1986	6.85	6.80	-.05
1987	7.30	7.26	-.04
1988	6.82	6.79	-.03
1989	6.87	6.86	-.01
1990	6.91	6.91	0
1991	6.67	6.67	0
1992	6.43	6.43	0
1993	6.19	6.19	0
1994	5.95	5.94	-.01
1995	5.70	5.70	0

Note: Import levels are net imports to the U.S. Balance of Payment area for all petroleum including purchases for the Strategic Petroleum Reserve.

Attachment 5

Estimated Impacts on Oil Import Bill
(Billions of 1981 Dollars)

Calendar Year	Continued MER Case	Shut-In Case	Difference
1981	89.75	89.75	0.00
1982	91.86	93.53	1.67
1983	92.40	94.74	2.34
1984	93.71	96.21	2.50
1985	93.55	93.46	-0.09
1986	99.56	98.68	-0.88
1987	109.29	107.86	-1.43
1988	105.07	103.67	-1.40
1989	109.07	107.96	-1.11
1990	112.97	112.30	-0.67
1991	112.37	112.16	-0.21
Present Value Discounted at 10 Percent Real	703.47	705.77	2.30

Note: These estimates assume that all imports are valued at the average price of imported crude oil. This reflects the likelihood that the differences between the two cases would largely be in crude oil.

Attachment 6

NPR-1 Revenues: 1982 - 2000

Naval Petroleum Reserve No.1 (NPR-1) is jointly owned by the government with Chevron U.S.A. The government's share of revenues varies according to the production zone and type of product, but averages about 78 percent for crude oil for the field. Using this percentage against the production figures in Attachment 1 and the prices shown in Attachments 2 and 3, alternative revenue streams can be calculated for the two production cases considered by this paper.

It is estimated that revenues from continued production at the maximum efficient rate over the period from 1982 through 2000 would total $19.6 billion in constant 1981 dollars. If production were to be constrained to 25,000 barrels of oil per day for the 3-year period from April 1982 to April 1985, revenues for the 18 year period would total $18.7 billion.

For purposes of this analysis, however, the revenues in 1981 dollars were discounted using a 10 percent per year factor, which provides a discounted net present value for each revenue stream. Using this approach, the net present value for continued production would total $10.2 billion. By comparison, the net present value for the shut-in case would totals only $8.3 billion. Based on these figures, the government would lose some $1.9 billion in revenue value between the two cases.

NPR-1 Revenues: 1982 - 2000
(Dollars in Billions)

	Continued MER Production		Revenues Based on Temporary Shut-in (25,000 BOPD) April 1982 - APril 1985	
	1981 $	NPV	1981 $	NPV
FY 1982	$ 1.7	$ 1.5	$ .8	$ .8
FY 1983	1.6	1.3	-	-
FY 1984	1.6	1.2	.3	.2
FY 1985	1.5	1.1	1.7	1.2
FY 1986	1.4	.9	1.7	1.1
FY 1987	1.3	.7	1.6	.9
FY 1988	1.2	.6	1.5	.7
FY 1989	1.1	.5	1.4	.6
FY 1990	1.1	.4	1.2	.5
FY 1991	1.0	.4	1.2	.4
FY 1992	.9	.3	1.1	.4
FY 1993	.8	.3	1.0	.3
FY 1994	.8	.2	.9	.3
FY 1995	.7	.2	.9	.2
FY 1996	.7	.2	.8	.2
FY 1997	.6	.1	.7	.2
FY 1998	.6	.1	.7	.1
FY 1999	.5	.1	.6	.1
FY 2000	.5	.1	.6	.1
Total	$ 19.6	$ 10.2	$ 18.7	$ 8.3

NPR-1 PRODUCTION DURING AN INTERRUPTION

Attachment 7

Should Naval Petroleum Reserve No. 1 (NPR-1) production be continued at the maximum efficient rate of recovery, its surge capability during an interruption would be limited to approximately 15% of its normal production rate for 90 days. For the scenario used in this paper where an interruption begins January 1, 1985, this capability would add about 2 million barrels to domestic production.

Should NPR-1 production be reduced to 25,000 BOPD during the period April 1982 to April 1985, its surge capability would obviously be much greater. Using the same scenario referenced above, production would increase from the shut-in rate of 2.25 million barrels per quarter to 25.7 million barrels in the first quarter of the interruption.

Production would decline rapidly after the first quarter of the interruption, and return essentially to the MER production curve about a year after open-up.

The table below shows the different production profiles responding to a January 1985 interruption.

NPR-1 Production: 1982 - 2000, With A January 1985 Oil Supply Interruption
(Barrels in Millions)

	Continued MER Production	Production Based on Temporary Shut-in (25,000 BOPD) Until Oil Interruption Occurs
FY 1982	60.7	35.0
FY 1983	57.3	9.1
FY 1984	54.9	9.1
FY 1985	53.8	70.0
FY 1986	46.8	53.5
FY 1987	41.5	48.3
FY 1988	37.4	43.3
FY 1989	33.6	39.0
FY 1990	30.3	35.0
FY 1991	27.2	31.5
FY 1992	24.5	28.4
FY 1993	22.2	25.5
FY 1994	19.8	23.0
FY 1995	17.9	20.7
FY 1996	16.1	18.7
FY 1997	14.5	16.8
FY 1998	13.0	15.2
FY 1999	11.7	13.8
FY 2000	10.5	12.4
Total, 1982 - 2000	593.7	565.1

Attachment 8a

Estimated Impact on World Oil Prices With Disruption in 1985
(Dollars per Barrel)

Calendar Year	Continued MER Case	Shut-In Case	Difference
1981	$37.79	$37.79	0
1982	35.74	35.90	$.16
1983	36.43	36.76	.33
1984	37.52	38.00	.48
1985	77.38	75.27	-2.11
1986	65.03	63.34	-1.69
1987	54.54	53.32	-1.22
1988	45.88	45.08	- .80
1989	39.65	39.21	- .44
1990	35.87	35.77	- .10
1991	34.92	35.15	.23
1992	37.68	38.23	.55
1993	43.64	44.25	.61
1994	50.13	50.57	.44
1995	55.26	55.47	.21

Note: All prices are expressed in real 1981 dollars for the average barrel of crude oil delivered to the United States.

Attachment 8b

Estimated Impact on Oil Import Levels With Disruption in 1985
(million barrels per day)

Calendar Year	Continued MER Case	Shut-In Case	Difference
1981	6.51	6.51	0
1982	7.04	7.14	.10
1983	6.95	7.06	.11
1984	6.84	6.91	.07
1985	4.46	4.44	-.02
1986	4.82	4.86	.04
1987	5.13	5.20	.07
1988	4.90	4.97	.07
1989	5.28	5.35	.07
1990	5.75	5.82	.07
1991	6.07	6.13	.06
1992	6.27	6.31	.04
1993	6.28	6.30	.02
1994	6.14	6.15	.01
1995	5.72	5.71	-.01

Note: Import levels are net imports to the U.S. Balance of Payment area for all petroleum including purchases for the Strategic Petroleum Reserve.

Attachment 8c

Estimated Impacts on Oil Import Bill With Disruption In 1985
(Billions of 1981 Dollars)

Calendar Year	Continued MER Case	Shut-In Case	Difference
1981	89.75	89.75	0.00
1982	91.86	93.53	1.67
1983	92.40	94.74	2.34
1984	93.71	95.81	2.10
1985	125.95	122.02	-3.93
1986	114.29	112.40	-1.89
1987	102.11	101.14	-0.97
1988	82.03	81.79	-0.24
1989	76.34	76.56	0.22
1990	75.29	76.01	0.72
1991	77.40	78.65	1.25
Percent Value Discounted at 10 Percent Real	674.13	675.52	1.39

Note: These estimates assume that all imports are valued at the average price of imported crude oil. This reflects the likelihood that the differences between the two cases would largely be in crude oil.

NPR-1 REVENUES: 1982 - 2000

Attachment 8d

Should an interruption occur at any time during the period April 1982 to April 1985, prices could increase dramatically. Bringing NPR-1 back on maximum production during this time would add significantly to Federal revenues. Under the scenario used for this case analysis in which an oil interruption occurred January 1985, revenues for FY 1985 would increase from $3.0 billion estimated under continued production, to $3.8 billion had NPR-1 been shut-in.

It is noted that even under the conditions of this scenario, the revenue stream from shut-in production over the 1982 - 2000 period would be slightly less than revenues estimated under continued production. It is also noted that the net present value loss over the period would be $1.1 billion.

NPR-1 Revenues: 1982 - 2000
Given An Oil Interruption in 1985

	Continued MER Production		Revenues Based on Temporary Shut-in (25,000 BOPD) April 1982 - April 1985	
	1981 $	NPV	1981 $	NPV
FY 1982	$1.7	$1.5	$.8	$.8
FY 1983	1.6	1.3	-	-
FY 1984	1.6	1.2	.3	.2
FY 1985	3.0	1.8	3.8	2.6
FY 1986	2.3	1.4	2.6	1.6
FY 1987	1.8	1.0	2.1	1.2
FY 1988	1.4	.7	1.7	.9
FY 1989	1.1	.5	1.3	.6
FY 1990	.8	.4	1.0	.4
FY 1991	.8	.3	1.0	.4
FY 1992	.8	.3	1.0	.4
FY 1993	.8	.3	.9	.3
FY 1994	.8	.2	.9	.3
FY 1995	.8	.2	.9	.2
FY 1996	.7	.2	.8	.2
FY 1997	.7	.1	.8	.2
FY 1998	.6	.1	.7	.1
FY 1999	.6	.1	.7	.1
FY 2000	.5	.1	.6	.1
Total	$22.4	$11.7	$21.9	$10.6

Mr. VAUGHAN. I would like to turn very quickly to your comments or questions about the appropriations for the NPR. There has been much discussion, as I am sure you are aware, about budget cutting, limits, and so on.

I report to you, sir, that the NPR budget requests have been exempt from this process and that the Naval Petroleum Reserve has received every dime it has asked for in its appropriation request. So, there are no limits, or have been no limits, imposed by this administration on the plans for the Naval Petroleum Reserves.

That, in short, is where we stand with respect to the budget.

With that, Mr. Chairman, Captain Gilmore and I are available to answer any questions that you might have.

Senator HUMPHREY. All right.

Captain Gilmore, do you have a separate statement?

Captain GILMORE. No, sir, I do not.

BACKGROUND ON THE NAVAL PETROLEUM RESERVES

Senator HUMPHREY. Fine.

Let me ask you, if I may, for some historical background on the reserve. Most of the fields were designated to the reserve back in the early 1900's I understand. Were they ever used during World War II or the Korean war?

Mr. VAUGHAN. They were used for a very short period of time during World War II, Senator, and then shut back in.

Senator HUMPHREY. But not since then, for military use.

Mr. VAUGHAN. For any use.

NAVAL PETROLEUM RESERVES PRODUCTION ACT

Senator HUMPHREY. Would you give me some background on the advent of the Naval Petroleum Reserves Production Act of 1976?

Mr. VAUGHAN. This act, Senator, occurred as a result of the Congress reaction—I think is fair to say—to what had happened to this country in the Arab oil embargo of 1973–74 and the resulting shortages that occurred in this country, and the things that happened to our economy as the result of those embargoes.

The Congress, as I understand it, passed the Naval Petroleum Reserves Production Act in 1976, authorizing the administration to open up those reserves, take them out of shutin status, open them up, and put them into production at the maximum efficient rate. It authorized this to be done for a period of 6 years which will terminate this coming April.

It also appropriated the necessary funds for such a program. I have detailed in my testimony what has been accomplished to date, and Captain Gilmore and his staff ought to be congratulated because that field has been very fully developed and is now, I believe, the second largest producing oilfield in the United States.

Under the law of 1976, the President is empowered, if he determines it is in the national interest, to extend production at the maximum efficient rate in 3-year increments, and that fact is to be reported to the Congress, and either House of the Congress may choose to override that Presidential decision.

This administration has studied the question, sent a report to the President recommending that we continue production for another 3 years at the maximum efficient rate. That was taken to the Cabinet Council, and through that process the President decided to extend production for another 3 years.

We are now at the stage of informing the Congress of the President's decision and the reasons therefor. I hope that answers your question.

Senator **Humphrey**. How soon will you be thinking about a further extension when this extension you seek expires, assuming it is granted? Are you beginning to think about the years beyond this next extension?

Mr. **Vaughan**. We certainly try to have a look into the future, Senator. I can best, I think, answer your question to say that in my judgment during the third year would be the appropriate time to put our major focus on that topic.

Senator **Humphrey**. Yes.

Mr. **Vaughan**. This oil business, internationally, is a fast-shifting situation. We try to keep up with it, but we certainly have ongoing analysis of the oil situation. At this time we are simply talking about the 3 years, we are not proposing that there be anything further than that.

Senator **Humphrey**. I do not underestimate the difficulties, if not the impossibility, of trying to reach a decision on a further subsequent extension.

My concern is that we are going to see a pattern develop here where Congress is asked every 3 years for yet another extension until this thing is gone.

I understand your explanation of the context. This was passed in 1976 after the 1973 cutoff and all the difficulties which ensued, not only during that cutoff, but the tightened supply and greatly increased cost in subsequent years.

NAVAL PETROLEUM RESERVE NO. 1, ELK HILLS

Let me ask you some questions about reserve No. 1. According to page 2 of your testimony, the remaining recoverable reserves in NPR-1 are about 970 million barrels still to be recovered.

How have you reached that estimate? Perhaps Captain Gilmore can answer.

Mr. **Vaughan**. I will ask Captain Gilmore to describe to you, Senator, how we arrived at that estimate.

Captain **Gilmore**. The remaining recoverable reserves are determined by reservoir estimates of oil in place. A percentage of recovery is applied to the amount of oil in place to determine how much oil is left to be recovered. There are a number of different structures and formations at Elk Hills, part of which have been produced for some years, part of which have just recently been developed.

So, as far as the peaking of these various reservoirs, they all basically peak at different times. But currently, that is an accurate figure on the remaining recoverable reserves. It could be increased by exploratory drilling if we find additional reservoirs at Elk Hills.

Senator **Humphrey**. What I am getting at is how conservative, how dependable an estimate is that?

Captain **Gilmore**. Well, that was prepared by our engineering committee at Elk Hills, and that committee is comprised of government members and Chevron members. Chevron is a joint owner in Elk Hills.

Senator HUMPHREY. That is proven reserves?

Captain GILMORE. That is proven reserves. That basically is the figure that we would expect to achieve through primary and secondary recovery.

We are also looking at enhanced oil recovery, and that could expand the amount of recoverable reserves.

Senator HUMPHREY. All of that 970 million can be recovered through primary or secondary?

Captain GILMORE. Yes, sir.

CHEVRON PARTNERSHIP

Senator HUMPHREY. Can you explain how a private company came to be involved in NPR–1?

Captain GILMORE. Chevron acquired properties owned by, I believe it was the Union Pacific Railroad, back in the late 1800's or early 1900's. The properties were awarded to the railroad for building the rail system across the United States, and Chevron, formerly Standard Oil Co. of California, acquired those.

So, they have held those reserves since the inception of the NPR. They own, as the Secretary said, about 22 percent of the resources at Elk Hills and the resources of Chevron have been combined with the Government's to form a unit. There is a unit operating agreement that controls the production of the field.

ELK HILLS PRODUCTION

Senator HUMPHREY. You are producing about 175,000 barrels a day, according to Secretary Vaughan, in Elk Hills.

Captain GILMORE. That is correct.

Senator HUMPHREY. At that rate, when would that 970 million barrels be exhausted?

Captain GILMORE. Probably about 2010, 2020. Of course, production will decline each year. We probably have reached our peak at Elk Hills at about 185,000 barrels per day; currently we are at 175,000 and that production will continue to decline. Secondary recovery work at the field will mitigate that decline to some degree, but basically the reserves will decline by about 10 percent a year and then be completely gone about the year 2010.

LONGEVITY OF NPR–1

Senator HUMPHREY. So, continuing production at the maximum efficient rate will exhaust the reserves by the year 2010; is that correct?

Captain GILMORE. I would estimate that is true; yes, sir.

Senator HUMPHREY. That is 30 years away. That sounds like a lot, but then 1950 was not so long ago.

Captain GILMORE. Just as a comparison, Mr. Chairman, Naval Petroleum Reserve No. 2 was leased in the early 1920's, at the time the Department of Interior had management responsibility for the reserves. As I recall, initial reserves at NPR–2 were around 1 billion barrels and that field currently is producing about 2,400 barrels a day.

Senator HUMPHREY. When will the remaining fields' reserves be exhausted under maximum efficient rate of production?

Captain GILMORE. That is the figure that I gave you, just about 2010, if the reserve continues to produce at its maximum efficient rate.

NPR–3 PRODUCTION

Senator **Humphrey**. What about No. 3?

Captain **Gilmore**. At NPR–3 the production rate currently is 3,500 barrels per day. As far as when those total reserves would be exhausted, it would probably be sometime before 2000.

It is an older field, and quite a bit of oil was produced during the time that Interior had management responsibility for the field. The Wall Creek Reservoir is the larger reservoir there and was produced rather extensively and rather hard at the time Interior had the field.

We are starting with some enhanced oil recovery pilot work at NPR–3 at the current time. We plan to complete that by the end of fiscal year 1983. That work, if the pilots prove successful, could expand the recoverable reserves at that field by 40 to 90 million barrels in the Shannon Zone, which is our Shallow Zone at NPR–3.

Senator **Humphrey**. You have 26 million barrels remaining at NPR–3, is that about right?

Captain **Gilmore**. That is correct, sir.

Senator **Humphrey**. And you are averaging about 3,500 barrels per day?

Captain **Gilmore**. That is correct.

Senator **Humphrey**. There is no intent, if this extension is granted, to substantially increase that.

Captain **Gilmore**. Well, the enhanced oil recovery could increase it above that figure. Secondary recovery could raise it a little bit with some of the work we have going now, but not substantially. It would come up some under a full, field-wide enhanced oil recovery program.

Senator **Humphrey**. But this relatively low rate of production is the result, then, of most of the easy oil having been used up already, is that it?

Captain **Gilmore**. That is correct.

Senator **Humphrey**. In other words, to gain access to that remaining 26 million would require secondary and tertiary recovery?

Captain **Gilmore**. Yes, we have secondary recovery work in progress, some water floods are active presently, others are being worked on and will be active very shortly, and enhanced oil recovery will be utilized later.

Once you peak out in your production in a field, then you start employing these other methods to obtain all the oil that can be efficiently obtained at an economical price.

Senator **Humphrey**. When was No. 3 produced, to have drained it so much?

Captain **Gilmore**. Back during the early to mid-1920's under the Department of Interior.

Senator **Humphrey**. It was not a Naval Petroleum Reserve at the time?

Captain **Gilmore**. Yes, sir, it was. There was quite a bit of publicity over that period of production. [Laughter.]

NAVAL OIL SHALE RESERVE

Senator **Humphrey**. How easily and quickly is petroleum in the shale reserves recoverable, that is not a very safe bet, is it?

Captain **Gilmore**. Well, the industry has started development in the shale reserves in the Parachute Creek area of northwestern Colorado.

There is quite a bit of activity out there by Exxon, TOSCO, Union, starting the initial industrial-type development of shale. It is very costly and it takes time, but they are moving ahead.

Now, in our own Naval Oil Shale Reserves we have substantial holdings in Colorado in particular, and we have a fair amount of shale in Utah. We estimate about 22 billion barrels of shale oil in place at NOSR-1 in Colorado with 2 to 5 billion recoverable with current technology and economics. We have done the bulk of our environmental work that would be necessary in order to start design and building plants.

So, for us to move into the oil shale business and start producing from the reserve there in Colorado, it would probably take us 5 or 6 years to get to a producing plant.

Senator HUMPHREY. In contrast with the petroleum reserves themselves, the oil fields, the shale reserves are not a ready source of supply and will not be for any time in the near future.

Captain GILMORE. That is correct. It takes longer to develop them, and the rates normally are smaller for the amount of work involved. From the Naval Oil Shale Reserve No. 1 in Colorado, we think we could get about 200,000 barrels per day; but it would require substantial investment to do that and a substantial amount of development work.

BASIS FOR CONTINUED PRODUCTION FROM NPR'S

Senator HUMPHREY. Mr. Secretary, you made the point in your testimony—as the President did in his report—that production from the NPRs has an important effect on reducing our consumption of imported oil. Yet, 180,000 barrels per day is not a very large amount in contrast with the 6 million barrels per day that we are importing today.

So, I come to the question, in that it has relatively little effect, is it worth it to deplete the only exclusive supply the military can depend upon today?

Mr. VAUGHAN. Well, Senator, obviously we think it is. It would reduce some $2.17 billion per year for the next 3 years on the balance of payments; it generates $1.6 billion annually for the Treasury, and in these times of tight economics these things are important.

The balance, I think, that is struck for the military is how responsive, what is the surge capacity of the two types of reserves.

In the case of the NPR the response, if it is totally shut in, is of some concern. What the military needs—and I think the witnesses to follow will indicate—is a fairly rapid response for the scenarios they foresee on their immediate planning horizons. The SPR is much more capable of responding to their needs because its surge capacity is much, much greater than that of the Naval Petroleum Reserves.

So, it is essentially in that kind of trade off that we think it is worth it.

Senator HUMPHREY. It seems to me that the argument about the revenue is taking precedence over the consideration for national security. Have we not become hooked on these revenues? Is it not like everything else? In effect, are we not selling off our assets to help fund Federal expenditures, is that not what it comes down to?

Mr. VAUGHAN. On the one hand, Senator, we are expending money to establish the SPR, the Strategic Petroleum Reserve, at the same time, the consideration here would be to shut-in the Naval Petroleum Reserves. The question is, is it worth it.

So, you look at the increment of additional surge capacity, what do you get? You just do not get enough benefit in the NPR to warrant the loss of those revenues and balance-of-payments benefits.

STRATEGIC PETROLEUM RESERVES

Senator HUMPHREY. As I understand it, when SPR is filled, the surge capacity will be 3 million barrels per day by 1985.

Mr. VAUGHAN. The target date for filling it, Senator, is 1989, at 750 million barrels. We are on target, or on our planning milestones, at this time.

Senator HUMPHREY. Good, I am glad to hear it.

I read in your testimony that the surge capacity will build up to 3 million barrels per day.

Mr. VAUGHAN. That is correct, Senator.

Senator HUMPHREY. One of my concerns is—that in the event of a Persian Gulf cutoff, which is about half of our 6 million barrels per day, the politicians here in Congress are going to make sure that their constituents are taken care of first, and possibly even at the expense of the military. I hate to say that, but that is my opinion.

I am not as sure as the administration that Members of Congress are going to be all that willing to deny their constituents heating oil or gasoline to get to work in order to run factories and to heat factories. I am not sure they are going to be willing to deny their constituents that.

I think they might be a little bit more willing to deny the military all that it might need in that kind of a situation.

Mr. VAUGHAN. Senator, I do not mean to be flip in my answer to you on that question. It seems to me that the President can only go so far in trying to urge the Congress to do what he thinks is right.

Senator HUMPHREY. Yes.

Mr. VAUGHAN. It seems to me this President has done, and there is every indication he will continue to do just that. We would certainly be prepared to urge, in our outlook on emergency planning as such, that there is no intent in this administration to allow the Strategic Petroleum Reserve to be used for price supporting, for minor interruptions. Quite the contrary.

It is the intent of this administration to hold that reserve to what it is named, a Strategic Reserve for severe, deep, protracted interruptions and let the market take care of things short of that.

Undoubtedly, if we get in situations short of that, we will get much pressure from the Congress to deal with these constituent problems, and that is part, I guess, what I get paid for.

But as I said, the intent of this administration is to withstand that pressure.

EMERGENCY SOURCE OF OIL FOR NATIONAL DEFENSE

Senator HUMPHREY. I am not talking about some minor disruption. The scenario that worries me is a complete cut off of Persian Gulf oil, 3 million barrels a day, which will just about match the surge capability of SPR.

I worry about the military getting its necessary share fighting against the interests—legitimate interests—of constituencies of Members of Congress.

I worry that you are giving up, by continuing to produce the Naval Petroleum Reserves, you are giving up the only exclusive supply the military has today.

To be sure, there is not the surge capability there, but there is a significant daily production there, 180,000 barrels a day. I think the military uses about 650,000 barrels a day—I am not certain of that figure but I believe that is about right. Someone's testimony said they used 238 million barrels in 1981, that figures out to about 650,000 barrels a day.

So, this steady production at Elk Hills today equals about 20 percent? What is 180,000 to 650,000? That is 15 to 20 percent, I guess.

Mr. VAUGHAN. That is about right.

Senator HUMPHREY. That is a significant part of the military's daily use of petroleum.

Mr. VAUGHAN. Two ways I would like to respond to that, Senator. First is that we have, as I indicated in my testimony, the Defense Production Act that allows and commands the President to be concerned about defense needs. We fully intend to use that act if that situation occurs.

Second, we have been talking about 3 million barrels. That, Senator, is at the two-thirds point in filling the reserve. In other words, when we get to 500 million we have 3 million surge capacity; we have 4½ million surge capacity when we reach the full projected fill of SPR, the 750-million barrel mark.

Senator HUMPHREY. That 3 million must be by 1985.

Mr. VAUGHAN. Yes. In fact, that is about the right time.

Senator HUMPHREY. You mentioned the Defense Production Act. But in 1973, the President had very great difficulty invoking that act because of pressure from airlines and other users of fuel. How can you be confident that that is your "back-door," if you will?

Mr. VAUGHAN. I can answer that question this way, Senator: The legal authority is there to do what has to be done under the Defense Production Act in our opinion. Then it is a question as to whether an administration will do those things.

I can only indicate to you that this administration clearly intends to do what is necessary for national security, and I think the President's track record on that score speaks for itself.

Senator HUMPHREY. Yes.

Mr. VAUGHAN. There seems to be no question that this President intends to have defense needs amply met, notwithstanding pressure.

Senator HUMPHREY. I have no doubt of that, and I agree with your analysis of the record.

Yet, I think you have to be aware that there will be intense political pressure not to take action under the Defense Production Act if it comes down to that. I will go on to another area.

PROCESS FOR PREPARING THE REPORT ON CONTINUED PRODUCTION

In preparing the report, the President's report, what was the military participation?

Mr. VAUGHAN. The initial internal planning, Senator, was done by Captain Gilmore. He wrote a report. That report recommended shutting the reserve in. It then came—that report in due course—to the Acting Assistant Secretary who decided that the report was too narrow; in other words, it considered essential only strategic needs and not the broader standard prescribed in the act, the national interest.

The Acting Assistant Secretary requested a more extensive look at the problem and reached the conclusion that production should be continued. In other words, he did not concur with Captain Gilmore.

Senator HUMPHREY. Yes.

Mr. VAUGHAN. I have since—that occurred before my time, Senator—I have since carefully reviewed that process and I am in full personal accord with the judgments that the Acting Assistant Secretary made at the time.

That recommendation proceeded on to the Secretary of Energy who concurred. It went on to the Cabinet Council. The Secretary of Defense concurred, or had no objection to this procedure and, as I understand it, there are witnesses here from the Department of Defense. They do concur with this position.

So, that is the involvement of the military, Senator.

STRATEGIC CONSIDERATIONS OF CONTINUED PRODUCTION

Senator HUMPHREY. Excluding the economic, fiscal, and other considerations, that is, focusing strictly on strategic considerations, Mr. Secretary, do you disagree with Captain Gilmore's recommendation? In the strategic sense only.

Mr. VAUGHAN. I guess that is kind of an academic question to say, can you totally exclude those factors?

Senator HUMPHREY. I want you to focus on that one element, if you will.

Mr. VAUGHAN. If you had nothing else to worry about and did not have to worry at all, I do not guess I could find much fault with that judgment.

However, I would point out to you that affecting the strategic consideration, which he did not address, was the revenue base—because, after all, it does take money to buy the things the Department of Defense needs. This production does generate revenue, does take some of the budgetary pressures off and they can be used for defense purposes as well as any other.

Senator HUMPHREY. Yes.

Mr. VAUGHAN. It certainly allows us to fill the strategic petroleum reserve, and that, in the military's view as I understand it, is more valuable than shutting in the reserve which would be exclusively theirs. I think that is very significant.

So, I guess in a sense what I do not agree with what his report said, it was not broadly based, it was addressed to a very narrow consideration.

Senator HUMPHREY. I understand. But I want to focus on each of these elements in considering the whole.

Mr. Secretary, may we have a copy of Captain Gilmore's report, recommendation?

Mr. VAUGHAN. Yes. I believe we have supplied it, or we certainly are willing to supply it; yes, sir.

[The information follows:]

Aug. 14, 1981

INFORMATION: To Provide the Secretary with Background Information and Recommendations Concerning Continued Production of the Naval Petroleum Reserves

The Secretary
Deputy Secretary

Acting Under Secretary

PROBLEM:

Is continued production of the Naval Petroleum Reserves in the national interest?

BACKGROUND:

Pursuant to the provisions of the Naval Petroleum Reserves Production Act of 1976 (P.L. 94-258), the authority to continue production from the Naval Petroleum Reserves (NPR) at their maximum efficient rates (MER) terminates on April 4, 1982. Continued production of any NPR at MER for an additional period of three years is authorized, provided: 1) an investigation has been made to determine the necessity of continued production; 2) the President submits to Congress, by October 4, 1981, a copy of the report made to him on the investigation together with a certification that continued production from that NPR is in the national interest; and 3) neither House of Congress adopts a resolution disapproving such recommendation for continued production within 90 days after receiving such report and recommendation from the President.

The Mitre Corporation was contracted by the Department of Energy to identify the major elements of this issue and perform trade-off analyses in each area, including strategic value, economic benefit and local area impact. While the Mitre study does not provide recommendations, it does contribute to the basis for policy decisions, and fulfills the requirement of an investigation to determine the necessity of continued production.

Should the President or Congress determine to discontinue MER production from any NPR, existing authority requires reducing production to that level necessary for proper reservoir management. Production from an NPR at a rate below MER, but above the rate required for proper reservoir management, therefore, would require a Joint Resolution of the Congress.

DISCUSSION:

To provide a frame of reference for making decisions on this issue, the Naval Petroleum Reserves (NPR's) were examined in terms of their strategic value, economic benefits, and local area impact under alternative production rates.

Two other points are key to the discussion. First, it is noted that while the impending expiration of authority is forcing a review and decision concerning NPR production at this time, the Secretary can, at any time, reassess and with the concurrence of the President recommend different production levels to the Congress. Second, it is useful to limit discussion of this issue to the next three years, during which time the NPR's can provide a substantial complement of domestic petroleum surge capability to the Strategic Petroleum Reserve (SPR).

The strategic value of the NPR's lies essentially in their capability to call forth large increases in domestic petroleum production. As with the SPR, this capability provides insurance against U.S. vulnerability to petroleum supply interruptions which can severely limit the Nation's ability to sustain military actions during wartime, and cause economic and social hardship during peacetime.

If NPR-1 production were reduced from its projected 1982 level of 180,000 barrels of oil per day (BOPD), to 25,000 BOPD, its annualized surge capacity would equal about 172,000 BOPD plus 53,000 barrels of oil equivalent per day of natural gas and liquid products, or approximately 25 percent of SPR capability during that period. NPR-3 produces only 3,400 BOPD currently, and does not have a significant surge capability.

The economic analysis related to this issue examined alternative NPR production levels for their estimated effect on GNP, for the change in present dollar value as a result of deferring sales, and for the difference in Federal revenues. Any reduction in NPR production will necessarily reduce GNP as it will require increased imports to substitute for the lost production. The analysis also indicates that deferred sales of NPR petroleum would reduce their dollar value under the assumptions used in the present value calculations. Finally, it is shown that reduced NPR production will reduce revenues to the Federal Treasury, even though sales over the three year period would still exceed NPR program costs.

The local area impact analysis indicated reduced production at NPR-1 would adversely affect local refineries by accelerating a situation in which such firms must process increasingly heavy crude oils. These effects were considered incidental to the larger impacts involving strategic value and economic benefit assessments.

CONCLUSIONS:

Using the decision criteria described above, but primarily because of its small surge capacity, there appear to be no compelling reasons to discontinue the maximum efficient rate of production at NPR-3 in Wyoming. At NPR-1 in California, the production decision hinges on the relative importance one attaches to strategic value versus economic benefits. In light of the limited near-term capability of the Strategic Petroleum Reserve during a period of vulnerability to a petroleum interruption, and because NPR-1 appears to offer the only practical large complement to the SPR as a means of reducing that vulnerability, the Office of Naval Petroleum and Oil Shale Reserves has concluded that it is in the best interest of the Nation to reduce NPR-1 production to obtain surge capability.

RECOMMENDATIONS:

The Office of Naval Petroleum and Oil Shale Reserves recommends:

1. That commercial sales of NPR-1 production be discontinued after April 5, 1982, and production be reduced to a level of 25,000 to 30,000 BOPD to meet operational requirements and to maintain NPR-1 in a high state of readiness. This level would be maintained until 1985, provided current market conditions continue and availability of petroleum for SPR fill and DOD uses is not constrained.

2. That authorization be obtained from the Congress permitting the Secretary of Energy discretion to increase NPR-1 production either a) to provide petroleum to the SPR should its fill rate fall below the 100,000 BOPD required by the Energy Security Act, or b) to provide petroleum to the Department of Defense in order to help meet its critical petroleum product requirements.

3. That NPR-3 production be continued at MER.

It is envisioned that the Secretary and other senior policy officials would be given a briefing on this issue at the Secretary's request. At that meeting, or subsequently, guidance would be given to the Office of Naval Petroleum and Oil Shale Reserves in order that appropriate materials addressing this issue may be prepared for review by the White House and other agencies.

If the NPR-1 recommendation to shut in production (25,000 to 30,000 BOPD) is accepted, a Joint Resolution must be requested from the Congress authorizing sufficient levels of production to maintain a high state of readiness. It will also be necessary to obtain authorization in the Joint Resolution giving the Secretary unilateral authority to increase NPR-1 production either a) to help fill the SPR, or b) to provide petroleum to DOD. It is noted again that the Secretary can, at any time, reassess and, with the concurrence of the President, recommend revised NPR production levels to the Congress.

If the NPR-3 recommendation to continue MER production is accepted, the President must submit such determination with a report of findings to the Congress by October 4, 1981. If neither House of Congress, within 90 days after receiving such report and certification, adopts a resolution disapproving further production, such production may be extended for three years, to April 4, 1985.

Barton R. House
Acting Assistant Secretary
Environmental Protection, Safety,
and Emergency Preparedness

BACKGROUND PAPER ON CONTINUED NAVAL PETROLEUM RESERVES PRODUCTION

BACKGROUND

This paper reports on a study initiated because authority contained in the Naval Petroleum Reserves Production Act of 1976 (P.L. 94-258) to produce the Reserves at their maximum efficient rates (MER) expires on April 4, 1982. Should a decision to continue production of one or more Naval Petroleum Reserves be deemed in the national interest, the President must submit such determination with a report of his findings to the Congress at least 180 days before the expiration date. If neither House of Congress, within 90 days after receiving such report and certification, adopts a resolution disapproving further production, such production may be extended for 3 years. Should the President or Congress determine to discontinue MER production from any NPR, existing authority provides for production at a level necessary for proper reservoir management. Production from an NPR at a rate below MER, but above the rate required for proper reservoir management, would require a Joint Resolution of the Congress.

There are two NPR's involved in this issue: NPR-1 at Elk Hills, California (currently producing 180,000 BOPD and 320 MMCF/D of natural gas), and NPR-3 at Teapot Dome, Wyoming (currently producing 3,400 BOPD and 20 MMCF/D of natural gas). The other Reserve, NPR-2 at Buena Vista, California and adjacent to NPR-1, has been leased and produced continuously since 1921, and at this point provides the Government with less than 300 BOPD in royalty oil. Inasmuch as there is no Government production from the unleased lands on NPR-2, P.L. 94-258 has no effect on the leases and a decision on continued production from this Reserve is not required.

NPR-3, wholly owned by the Government, has remaining recoverable reserves of about 26 million barrels of crude oil. This Reserve should be continued on production at MER because of its limited reserves and production capability, economic considerations, and to avoid possible disruption of an enhanced oil recovery effort now in progress. Given the strong case for that course, NPR-3 will not be discussed in detail in this paper; however, it will be discussed in the local area impacts and conclusions sections.

NPR-1, on the other hand, presents a complex public policy issue. In the vernacular of the petroleum industry, it is a "giant" field with remaining recoverable hydrocarbon reserves of more than 1.25 billion barrels and a production capacity in the United States second only to Prudhoe Bay in Alaska. It clearly has the potential, therefore, to provide the Nation with a significant strategic reserve of petroleum if production is shut in. There are also persuasive economic arguments for continuing production, however. Accordingly, the remainder of this paper focuses on the desirability of continued full production versus shut-in or reduced production at this Reserve.

The Mitre Corporation was contracted by the Department of Energy to identify the major elements of this issue and perform trade-off analyses in each area, including strategic value, economic benefit and local area impact. While the Mitre study does not provide recommendations, it does contribute to the basis for policy decisions, and fulfills the requirement of an investigation to determine the necessity of continued production.

Besides the Mitre study, there have been discussions with staff of the Armed Services Committees, the Department of Defense and other offices in the Energy Department. Although the discussions outside the Department did not result in strong or persuasive arguments either for or against continued production, the Deputy Assistant Secretary of Defense for Energy, Environment and Safety, has indicated his support for a production level of 75,000 BOPD, with all the Government's share of oil going to the Department of Defense (DOD).

It should be noted that the "shut-in" case would equate to production of at least 25,000 BOPD for 18 months after April 4, 1982. First, a production level of 8,000 BOPD would be required at NPR-1 for proper reservoir management — 5,000 BOPD from the Shallow Oil Zone and 3,000 BOPD from the Stevens Zone. The second factor results from the unitization agreement at NPR-1 with Chevron U.S.A. As part of the consideration to Chevron for including additional lands in the NPR-1 Unit, and thereby relinquishing control over the time and rate of production, it was agreed that if NPR-1 were shut in, Chevron would receive 20,000 BOPD of consideration oil from the Stevens Zone, which would include the 3,000 BOPD mentioned above for reservoir management, until one-third of the estimated recoverable oil underlying the Chevron lands involved in this agreement was received. It would take about a year-and-a-half after shut-in to fulfill this commitment. Such production is permitted during a shut-in status under 10 U.S.C. 7426(c).

There are discretionary considerations, as well, which could result in production above the levels identified above. However, congressional authorization for such production would be necessary, as under 10 U.S.C. 7422(b), any production other than for testing, conserving, protecting and maintaining the Reserves requires a Joint Resolution. Such considerations include use of the NPR for filling the Strategic Petroleum Reserve (SPR), either continuously or intermittently when conditions are unfavorable for open market purchases, and the sale of NPR petroleum to the Defense Department. Further, if NPR-1 is to be maintained in a high state of readiness — i.e., the capability to return to full MER production in 90 days — production of around 25,000 to 30,000 BOPD would be required in order to keep the gas plants and other facilities needed for production in a standby operational status.

These operational and discretionary, high priority concerns must be addressed as policy questions, but are secondary to the decision whether to reduce NPR-1 production below the maximum efficient rate of recovery.

DISCUSSION

The following discussion describes the NPR production alternatives and their related impacts. The crux of the discussion is this: the economic analysis favors continuing MER production; the strategic value associated with conserving the billion barrel NPR for use during petroleum interruptions, military conflicts and tight supply markets favors reducing production in order to complement the Strategic Petroleum Reserve surge capability over the next few years when the United States is particularly vulnerable.

It should be noted that a decision at this point on NPR production levels does not preclude subsequent adoption of a different production level through enactment of a Joint Resolution of Congress. The Secretary can, at any time, reassess and with the concurrence of the President recommend different production levels to the Congress. Because NPR-1 production is expected to peak in November 1981, however, continued production at the maximum efficient rate will result in steadily declining oil production capability, reducing the flexibility of choices on subsequent production levels. If production were continued at MER, natural gas production would continue to increase by about 3,000 BOEPD to 56,000 BOEPD in 1985, and decline thereafter.

Strategic Value

This section is discussed in terms of U.S. vulnerability to petroleum supply interruptions and the contribution NPR-1 could make to reducing that vulnerability. Our vulnerability stems from the fragile structure of the international oil market, the instability of the major oil exporting countries of the world, and the potential for interdiction of oil tankers during wartime. Both the Administration and the Congress now agree that a large national oil stockpile offers the most effective response to these threats by creating the ability to call forth substantial increases in domestic petroleum production.

Based on the Energy Information Administration's reports, petroleum products supplied for domestic use has stabilized at about 16 million BOPD in recent months, with 11 million BOPD coming from domestic sources, and 5 million BOPD being imported, primarily from developing countries. A moderate to severe interruption of these imports and/or supplies purchased on the international market for overseas use would have a major adverse impact on the Nation. A severe interruption of imports to other International Energy Agency members would also have a major impact on the U.S.

During wartime, a severe interruption would impact the Nation's ability to sustain a conventional military action and might place the U.S. in a position of terminating the action or escalating to a nuclear war. (See GAO report entitled: DOD's Industrial Preparedness Program Needs National Policy To Effectively Meet Emergency Needs.) The military petroleum requirements during wartime could expand from about 450,000 BOPD to about 1.5 million BOPD. Any shortfall in normal supplies to the military caused by enemy action would exacerbate the domestic supply situation caused by the higher military demands.

During peacetime, a severe interruption could cause economic and social hardship on the Nation, and a reduction of military training and readiness. In order to ensure that the military forces have adequate petroleum supplies available to sustain a war effort and to protect the Nation against the adverse economic effects of episodic interruptions of foreign petroleum imports, strategic petroleum reserves have been created.

The Strategic Petroleum Reserve represents the Government's primary emergency source of petroleum. It was created by the Congress in 1975 to diminish the vulnerability of the United States to the effects of a severe energy supply interruption and for carrying out obligations of the United States under the international energy program. Ultimate capacity of the Reserve is envisioned as 1 billion barrels. Current SPR reserves are about 170 million barrels, with 250 million planned for 1982, about 400 million planned by 1985, and 750 million planned for 1989. The SPR has the ability to draw down its reserves at a high rate — 1.6 million BOPD, currently, increasing to 4.5 million BOPD when filled to 750 MMB — but its capability is limited in the near term because of the quantity of oil in storage. Through 1985, the SPR might only be used in the event of a severe shortfall in petroleum supplies inasmuch as its use during minor interruption might raise the Nation's vulnerability to an unacceptable level.

The Naval Petroleum and Oil Shale Reserves were established early in this century, primarily as an emergency source of petroleum for the military. In 1976, the mission of the Reserves was expanded to provide for "...essential defense, industrial and military emergency energy requirements relative to the national safety, welfare and economy, resulting from foreign military or economic actions." The Naval Oil Shale Reserves, containing approximately 22 billion barrels of recoverable shale oil, are undeveloped and would not be available to meet any near term emergency. In 1976, Congress placed the Naval Petroleum Reserves on full production for six years, among other reasons to self-fund their full development. The Naval Petroleum Reserves are now essentially developed, and in November 1981, NPR-1 will reach its peak productive capacity of about 190,000 BOPD.

If NPR-1 remains on full production after April 1982, it would have a surge capacity for emergency requirements of only 25,000 BOPD which would decline over time with the MER production curve. If NPR-1 production were reduced to 25,000 - 30,000 BOPD, however, it would be able to provide a surge production capability estimated at 313,000 barrels of oil equivalent per day (BOEPD), including 261,000 (BOPD), for 30 days, and an average of 225,000 BOEPD and 172,000 BOPD of surge capacity for a year. Further, it is noted that production could be continued at a declining rate for the duration of any foreseeable interruption inasmuch as recoverable reserves from NPR-1 exceed 1 billion barrels of oil equivalent.

It is instructive now to compare potential emergency requirements for petroleum with the Nation's ability to meet those requirements from Government-controlled stocks.

NPR AND SPR COMPLEMENTARY SURGE CAPABILITY FOR A ONE-YEAR INTERRUPTION

	1982		1985	
	Average Surge Rate MBD	Effective One-Year Reserve (MMB)	Average Surge Rate MBD	Effective One-Year Reserve (MMB)
NPR 1/ (crude oil/ oil equivalent)	172/225	63/82	172/225	63/82
SPR 2/ (crude oil only)	685 3/	250	1096 3/	400
Total Surge Capability	857/910	313/332	1268/1321	463/482
	MBD	MMB	MBD	MMB
Estimated Imports 4/	6200	2263	5500	2000

1/ Assumes NPR-1 shut-in at 25,000 BOPD level after April 4, 1982.

2/ Assumes SPR reserves of 250 MMB in 1982, about 400 MMB at the end of 1984.

3/ Average rate for year if SPR is depleted.

4/ Based on EIA's medium price range scenario.

In summary, NPR-1 has been essentially developed and can offer a substantial complement to the surge capability of the SPR, particularly in the near term (to 1985), as shown in the table above. The strategic value of NPR-1 should not be readily dismissed, therefore, as it significantly enhances the flexibility of our national strategic petroleum reserve system, and may offer the only practical alternative in the near term to augumenting the SPR.

Economic Trade-Offs

The strategic value to be gained from shutting in some portion of NPR-1 to achieve surge potential is not without some "costs." The issue is whether the imputed economic effects outweigh the strategic value associated with the increased surge capacity from shutting in NPR-1. In that regard, it is noted that stockpiles covered under the Strategic and Critical Materials Stock Piling Act are "...to serve the interest of national defense only, and are not to be used for economic or budgetary purposes." While the Naval Petroleum Reserves are not covered by that Act, we believe it is appropriate to consider them in the same context inasmuch as they do act "...to decrease and preclude a dangerous and costly dependence by the United States upon foreign sources for supplies of such materials in times of national emergency." Although this should temper the weight given to the economic cost of shutting in the Reserves, a complete examination of the economics is necessary for decisionmaking.

The economic impacts examined by the Mitre study were twofold: those related to the effects of increased imports (external costs), and those which may result from deferring sales (internal costs).

Using calculations based on generally accepted economic theory, the Mitre study estimated FY 1983 Gross National Product (GNP) losses resulting from complete shut-in of NPR-1 (8,000 BOPD) on the order of $2.4 billion. Approximately $1.1 billion of that loss is related to NPR-1 sales (internal cost). The balance of the loss is due to the "external" impact from imports, increased oil prices and real output decline. It is noted that the effect of increased imports is no different in kind than the GNP effects resulting from filling the SPR. Mitre and the Office of Policy, Planning and Analysis also suggest that reduced production could adversely affect domestic inflation rates (increase Consumer Price Index 0.1 percent) and world petroleum prices (increase of 25 cents per barrel). We believe those impacts are substantially overstated during a slack world oil market. For example, it is not clear that recent SPR purchases of three times the magnitude which would result from shutting in NPR-1 have had any adverse impact either on domestic inflation rates or the price of oil in the international market. Inasmuch as there have been no apparent adverse effects resulting from the recent high fill rate of the SPR, and because future increases in imports resulting from both SPR fill and shut-in NPR-1 production would not normally exceed the May SPR fill rate, the external impact on GNP is assumed to be in an acceptable range and will not be discussed further in this section.

The internal costs resulting from shutting in NPR-1 are calculated on the assumption that the value of revenues will be decreased as NPR-1 sales are deferred. The key elements in the present value calculations are a discount factor of 10 percent, and an assumption that the real price of petroleum will increase at an annual rate of 3 percent. On that basis, the calculated present value loss for deferred NPR-1 sales had a wide range for different near term production levels — $1.5 billion, where production was reduced to 75,000 BOPD until 1985; $2.6 billion, where production was reduced to 25,000 BOPD until 1985; and $6.5 billion, where production was reduced to 8,000 BOPD until 1990 (the Mitre shut-in case). Spreading that imputed loss in the two former cases over the surge capacity each would provide for a year — effective reserves of 44.5 MMB and 62.8 MMB, respectively — the present value loss per barrel ranges from $34 to $41.

Although it is beyond the scope of this paper to explore the costs of alternative strategic petroleum reserve systems, it is useful as a point of reference to compare the NPR-1 present value loss to SPR costs. For purposes of this example, figures are used from the case where production is constrained to 25,000 BOPD until 1985. That constrained production rate would withhold 145.3 MMB of NPR-1 crude oil from production. Of that amount, 62.8 MMB could be recovered during a one year interruption, with the remaining 82.5 MMB of deferred production being recovered over the lifetime of the Reserve due to technical production contraints. In this case, the imputed present value loss from deferred revenues is calculated to be $41 per barrel.

By comparison, had the 145.3 MMB gone into the SPR all of it could have been used during the one year interruption due to the large SPR drawdown rate capability. The present value loss of $978 million in that case is about two-thirds that for NPR-1. To that cost, however, must be added $545 million for SPR construction, figured conservatively at $3.75 per barrel, which raises the SPR costs to $1.5 billion, or a total of $10 per barrel. While these figures may not be exactly precise, due to the omission of smaller costs such as O&M, they clearly show the order of magnitude of costs between NPR-1 and the SPR as petroleum reserves. While this comparison may make NPR-1 appear to be a costly complement to the SPR, the economic benefits to be gained during a severe petroleum interruption by reducing GNP losses may still make NPR-1 surge capability cost-effective. For example, if there is a net shortfall interruption during the period of reduced production, real price increases are likely to be far greater than the 3 percent annual rate used in the present value calculations and would significantly reduce, if not offset the estimated present value losses. Further, it is not clear that there are any practical alternatives to NPR-1 as an additional source of domestic surge capacity in the near term.

Another financial impact of reducing NPR-1 production would be the effect on the Federal budget. Revenues from NPR petroleum sales go into the U.S. Treasury and have no direct impact on the Energy Department's budget. Those revenues do act to balance the overall Federal budget, however. Compared to continued production at MER, revenues to the Treasury based on a near term production level of 25,000 BOPD would be decreased by $1.0 billion in FY 1982, $2.0 billion in FY 1983 and $1.8 billion in FY 1984. Even with these reductions in revenues, gross NPR sales would exceed the NPR program budget. Also, using the case above where production of crude oil is increased to an average production of 197,000 BOPD in FY 1985, it is noted that revenues to the Treasury would be $1.4 billion more than would have been received in that year had MER production been continued. It is noted that these revenue figures include natural gas and liquid products sales as well as crude oil, which contributes about 90 percent of the impact. Also, as noted previously, we do not believe it is the congressional intent that budgetary considerations should be given significant weight in decisions regarding NPR production rates.

Note: An appendix to this paper provides additional detailed economic data.

Local Area Impact

NPR-1 and NPR-3 are discussed separately in this section with emphasis on NPR-1 since its impact on the local (Kern County) economy is much greater. The greatest impact of reduced production or shut-in of NPR-1 concerns not so much the quantity of oil produced, as it relates to reducing the average quality of crude oil produced in the San Joaquin Valley. The reduced quality would affect pipeline operators and local refiners.

NPR-1 supplies about 30 percent of the crude produced in the San Joaquin Valley. The impact on local refineries is substantially less than that might imply, however, because 60 percent of all San Joaquin Valley crude is transported to coastal refineries for processing. It is difficult to measure precisely, therefore, to what extent lower NPR-1 production might require local refiners to make capital improvements, if any, to process a heavier crude mix, and the effect on pipeline operators who use NPR-1 crude as a blending stock to increase oil gravity and thereby increase pipeline throughput. It is understood from discussions with several Kern County small refiners that without the light crude produced at NPR-1 to blend with the plentiful heavy crude, their refinery yields would produce a higher percentage of residual fuels which already have a depressed market, and lesser quantities of the more profitable gasoline. The only way these refineries could obtain sufficient quantities of light crude to replace the NPR-1 oil, is by truck from the Long Beach area, which the refiners claim is uneconomic. Evidently, many of the small refiners in the vicinity of Elk Hills do not believe current petroleum product market conditions will permit the substantial investment involved in retrofitting their refineries in order to process the indigenous heavy crude oil. The Mitre study indicates that the main effect is one of accelerating these impacts, which will occur in any case as the proportion of light crude oil production decreases.

Another local area consideration relates to natural gas sales at NPR-1 which will amount to about 100 million cubic feet per day in 1982. While present sales represent 25 percent of California production, they account for only three percent of California's natural gas consumption. It is understood that consumers of NPR-1 natural gas could obtain new suppliers. This is particularly important regarding the enhanced oil recovery operators in the area who use about 50 percent of NPR-1's natural gas.

The greatest local area impact will be the effect on Chevron, which has an equity share in NPR-1, and refines its crude at Bakersfield and Richmond. As a result of its equity share, Chevron receives approximately 20 percent of the petroleum produced at NPR-1, which equates to about 36,000 BOPD presently. Of course, as noted earlier, Chevron would continue to receive 20,000 BOPD as consideration oil for 18 months after April 4, 1982, even if shut-in were to occur. While the loss of the NPR-1 oil to their operations will clearly reduce their profits in the near term, that impact is beyond the scope of this issue.

The impact of NPR-3 production near Casper, Wyoming, is substantially less than that at NPR-1. Its 3,400 BOPD account for only about 1 percent of total crude production in Wyoming, and is only 5 percent of total refinery capacity in the Casper area. The local area impact for NPR-3 operations, therefore, is considered to be negligible.

CONCLUSIONS

As indicated above, the potential strategic value to be gained from conserving the Reserves, while continuing development of the field for an increased surge capacity, for use during periods of greater need than exist today, favors reducing production below MER; the economic calculations favor continued production at the maximum efficient rate; and the potential local area impact is somewhat indifferent, but would tend to favor some production above complete shut-in.

Given these areas of consideration, there appear to be no compelling reasons to discontinue MER production at NPR-3 in Wyoming. The economic calculations favor that course, the Reserve offers minimal strategic value given its low production rate of 3,400 BOPD, and a decision to shut-in could disrupt the on-going enhanced oil recovery project, which has potential for substantially increasing its recoverable oil (40 to 90 million barrels).

The decision about NPR-1 hinges on the trade-offs between strategic value and economic benefits. The following economic reasons favor continued production of this Reserve at its maximum efficient rate.

- To avoid potential present value losses associated with deferred revenues.
- To avoid GNP losses, and other potential adverse economic impacts.
- To avoid the loss of near term revenues to the Federal budget.
- Because of the potential for less costly reserves.
- Reduced NPR production increases imports.

However, the decision must give considerable weight to the strategic value to be gained in the near term from conserving NPR-1 in light of current SPR capability. It is noted that the minimum production rate necessary to maintain NPR-1 facilities in a high state of readiness for maximum surge production is 25,000 to 30,000 BOPD. With complete shut-in (8,000 BOPD), many of the facilities would be "mothballed" and require approximately 6 months to return the Reserve to its maximum production rate. Because of the lost strategic value resulting from that delay, it is concluded that production should not be reduced below the 25,000 to 30,000 BOPD level. The following rationale support reducing NPR-1 production to that maximum readiness level.

- Effectiveness of the SPR is limited in the near term because its size will be less than half that authorized by the Congress.
- NPR-1 surge capability is significant (approximately 25 percent) in comparison to the SPR in the near term.
- NPR-1 offers the only practical option, besides the SPR, for creating greater near term surge capacity for domestic petroleum production.
- Offers an important tactical complement to the SPR and enhances the flexibility of a national petroleum reserve system. The National Petroleum Council's April, 1981, report on Emergency Preparedness for Interruption of Petroleum Imports into the United States, states that SPR stocks of 200 MMB should be held in reserve for vital defense, health and safety needs. Stocks above that level would be available for cushioning the impacts of supply interruptions. With just over 200 million barrels in storage at the SPR in April 1982, NPR could provide the major response to offset the adverse economic impacts of a supply interruption in the near term, and approximately 30 percent of the response in 1985. Due to its large size and characteristics, NPR-1 can be used many times and still provide a significant complement to SPR.

- Consistent with historical use of the Reserves.
- Consistent with the National Energy Policy Plan.
- Strategic and Critical Materials Stock Piling Act language that such materials, whose character we believe is consistent with the NPR petroleum, are "... to serve the interest of national defense only, and are not to be used for economic or budgetary purposes."

It is noted again that the decision at hand is only for the near term (to 1985). This is an important consideration in that by 1985, it may be expected that there will be a much clearer picture of synfuel development, the domestic oil production and oil import trends should have adjusted to the erratic market imbalances in recent years, the SPR should have more than doubled its present reserve, and there will be a much clearer picture as to how the domestic energy transition is proceeding. If NPR-1 production is continued at MER past April 1982, its capability to respond to near-term interruptions will have been substantially diminished during the period of greatest vulnerability.

It is noted that the Congress indicated in the Energy Security Act a similar sense that during the period from now to 1985 the United States is particularly vulnerable to a petroleum interruption, and that the NPR and SPR should be coupled to reduce our vulnerability. That Act provides that no portion of the United States share of crude oil from NPR-1 may be sold or disposed of, other than to SPR, unless SPR has at least 500 million barrels of oil or SPR is acquiring oil for storage at an average rate of at least 100,000 BOPD per fiscal year.

Along that line of reasoning, it might be recommended that NPR-1 production be continued at MER, with the output going into the SPR where it can be withdrawn more quickly during an interruption. Should other sources of petroleum for the SPR not be available, that would appear to be an appropriate action; for the present, however, petroleum supplies are available from other sources to fill the SPR at its maximum rate and surge capacity gained from shutting in NPR-1 adds to the Nation's strategic capability.

A final point goes to the initial national defense aspects for establishing the Reserves — i.e., to provide a secure source of petroleum for defense, industrial, and military emergency requirements relative to the national safety, welfare and economy, particularly resulting from foreign military or economic actions. Historically, the Naval Petroleum Reserves have been an emergency source of petroleum for the military and it was only recently that the Reserves' mission was expanded to include the production of petroleum to satisfy industrial emergency energy requirements. In light of the fact that the Department of Defense may utilize the Defense Production Act to obtain petroleum products, we must look at the issue of petroleum reserves in a broader context than just the needs of the military. If NPR-1 production is to be continued at MER, it must be demonstrated to the Congress that that course is in the national interest given all considerations.

Appendix to Information Memorandum on Naval Petroleum Reserves Production

Production History and Surge Capability

Historically, NPR-1 was created to provide a secure emergency source of petroleum for the military. Only recently was the Reserves' mission expanded to include production to satisfy essential industrial emergency energy needs relative to the national safety, welfare, and economy, such as we would face during an oil embargo, political disruption in an oil exporting country, or wartime. It should be noted that the emergency surge capacity of the Naval Petroleum Reserves has been utilized on only two occasions during its 60-year history: during World War II for defense purposes, and currently. Figure 1 provides a graphic display of the production history of NPR-1.

The Naval Petroleum Reserves were placed on production at the maximum efficient rate of recovery for 6 years beginning in 1976, with a primary goal of reaching full production capacity. Once developed, they would be best able to serve national defense requirements, particularly those associated with a military conflict or war. Figure 2 shows the production profiles for continued production at MER, which should peak at 190,000 BOPD in November 1981, and at a reduced level of 25,000 BOPD to illustrate the magnitude of NPR-1 surge capacity made available in the near term through reduced production below the MER.

FIGURE 1

NPR-1 PRODUCTION HISTORY

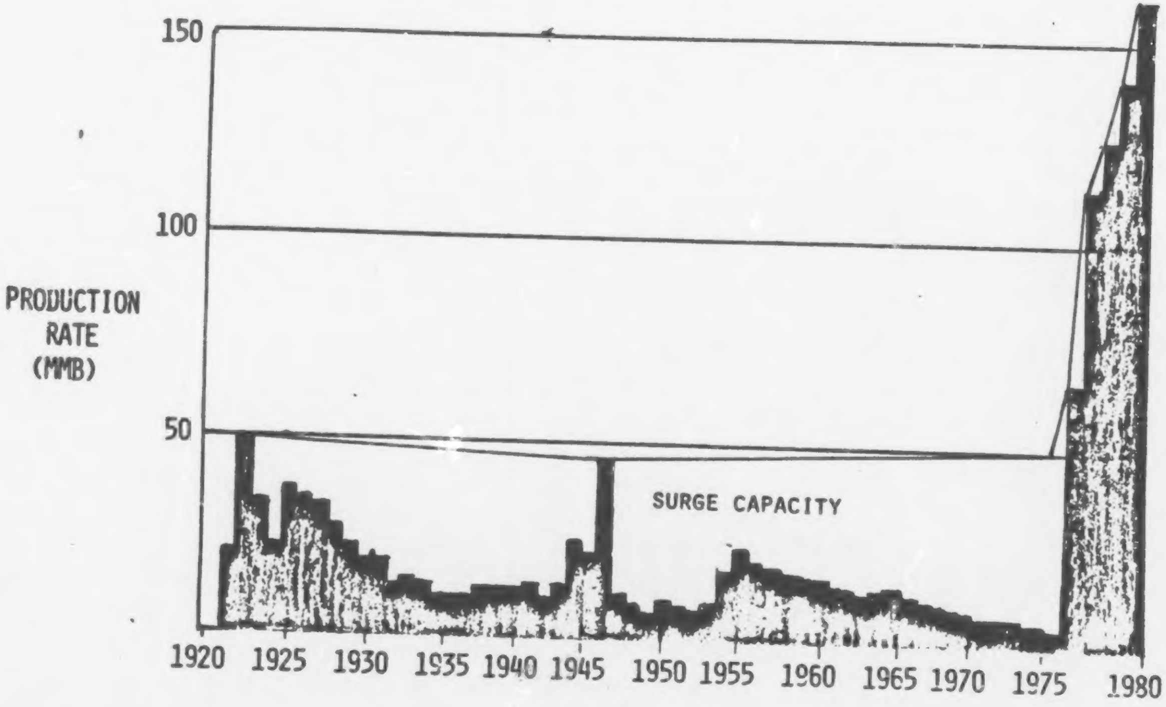
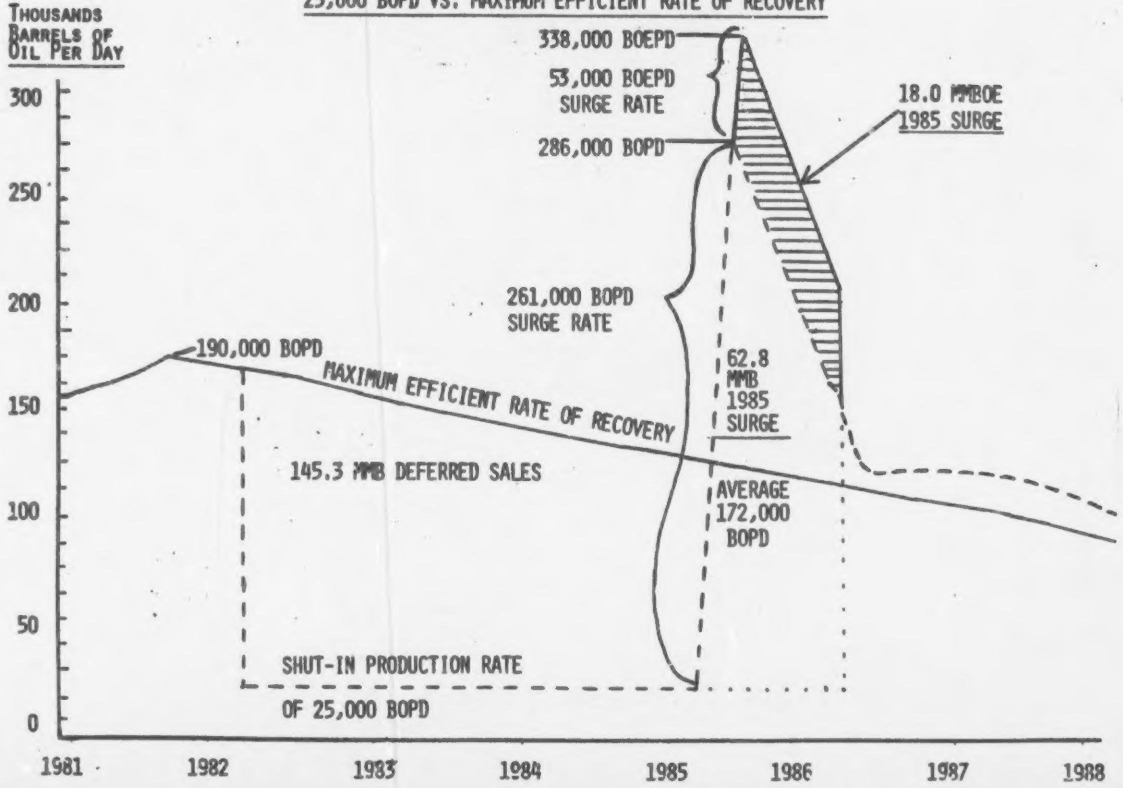


FIGURE 2

NPR-1 SURGE CAPABILITY WITH PRODUCTION REDUCED TO 25,000 BOPD VS. MAXIMUM EFFICIENT RATE OF RECOVERY



Economic Impact of Alternative Production Levels

Several NPR-1 production levels were developed to help put in perspective both the extent of surge capability and the potential economic losses associated with producing the NPR's at less than MER. Nominal cases for alternative NPR-1 production levels are listed below in order of decreasing present value revenues, and are defined as follows:

- Case 1: Continued production at MER.
- Case 2: Production is reduced to 75,000 BOPD after April 4, 1982. The reserves are produced at maximum production in 1985, and then produced at the maximum efficient rate of recovery rate until depletion.
- Case 3: Production is reduced to a level of 50,000 BOPD after April 4, 1982. Same as Case 2 beginning in 1985.
- Case 4: Production is reduced to a level of 25,000 BOPD after April 4, 1982, for 18 months in order to provide Chevron its consideration oil. Subsequently, production is maintained at that level to maintain a high state of readiness until 1985. Same as Case 2 beginning in 1985.
- Case 5: Production is reduced to 8,000 BOPD after April 4, 1982, until 1990 when MER production is resumed. (This is the shut-in reference case used in the Mitre study; however, it could not in fact be implemented until 1983 due to the requirement for providing consideration oil to Chevron, as noted earlier.)

Figure 3 shows the cumulative net present value of the revenue streams for Cases 1 and 2 to illustrate their relationships. Cases 3, 4 and 5, would fall beneath the Case 2 line since they forego greater revenue values.

The figures in Table 1 show the broad range of expected present values over a period of 18 years between continued MER production and the maximum shut-in case — $6.5 billion. They also show that the estimated loss in present value can be substantially reduced if it is assumed that production is curtailed only for the near-term — i.e., to 1985. It should be noted that the figures shown in the table above are referred to in the Mitre study only as "internal" costs, and do not include the economic losses accruing to the adverse impact on GNP, et cetera, which are called "external" costs. Those external costs are related to the macroeconomic impacts which are estimated in the Mitre study to be approximately 1.2 times the selling price of NPR oil minus its production cost.

Table 1

Illustrative Cases for Comparing Alternative

NPR-1 Production Rates and Present Value of Revenues

Case	1982-1985 Production Rate (MBD)	Cumulative Present Value From Revenues 1982-2000 ($B)	Estimated Loss in Present Value ($B)
1	MER	14.7	-
2	75	13.2	1.5
3	50	12.8	1.9
4	25	12.1	2.6
5	8	8.2	6.5

FIGURE 3

NPR-1 REVENUES NET PRESENT VALUE

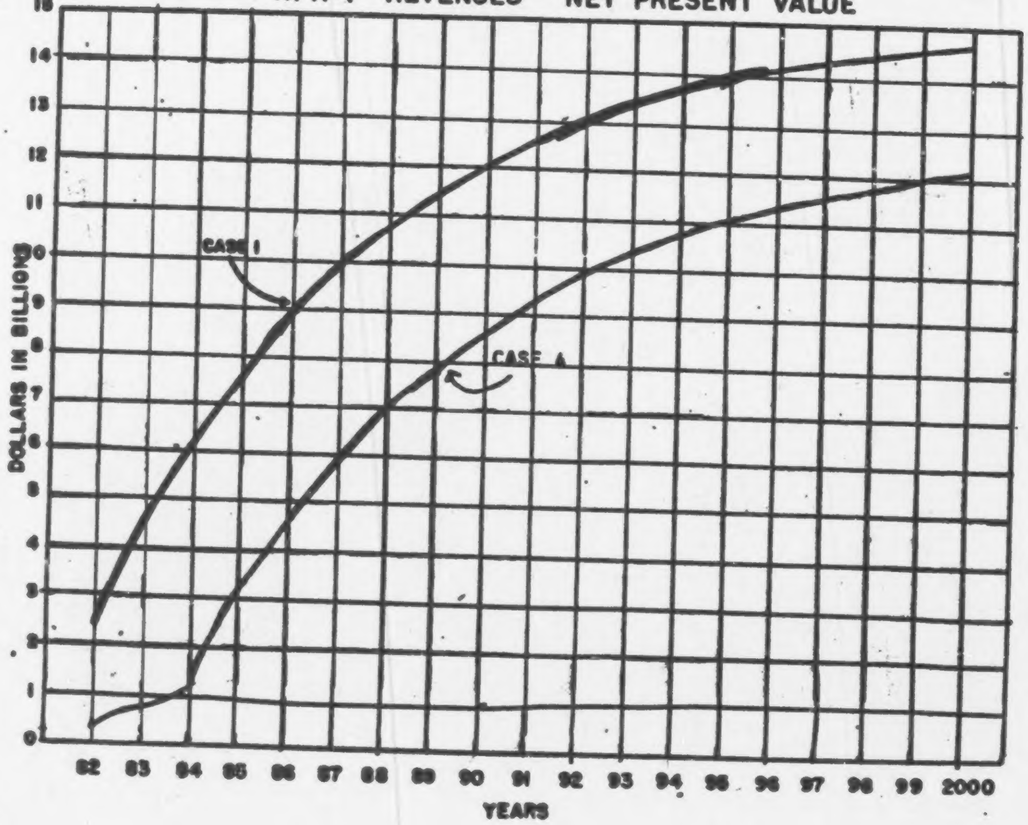


Table 2 has been constructed to show the cost per barrel for surge capacity based on present value lost if the NPR's are not produced at MER. This calculation divides the lost economic value by the surge capability for the different cases (maximum 1985 production less constrained production).

Table 2

Surge Capability and Strategic Reserves, and Imputed Cost per Barrel Based on Length of Interruption

Case	1985 Production Capability (MBD)	1985 Surge Capability (MBD)	1985 Strategic Reserve Provided Net to Case 1 (MMB)		Present Value Loss per Barrel	
			6-Month	12-Month	6-Month	12-Month
1	128	-	-	-	-	-
2	197	197 - 75 = 122	22.0	44.5	$68.18	$33.71
3	197	197 - 50 = 147	26.5	53.7	$71.70	$35.38
4	197	197 - 25 = 172	31.0	62.8	$83.87	$41.40
5	197	197 - 8 = 189	*	34.0	-	$191.18

* 6 months required to "de-mothball" the facilities.

Note: The rate of recovery shown in 1985 for Cases 2, 3 and 4 is greater than the peak MER projected for November 1981. This results by continuing development activities while the field is producing at a reduced level. It is also noted that the production figures shown are for crude oil only. NPR-1 also produces natural gas and liquid products which could add surge capacity of 30,000 to 50,000 barrels per day of oil equivalent to crude oil production.

The results derived in these tables are informative in several respects. First, it can be seen that the large present value loss identified in the Mitre study between continued production and shut-in can be substantially reduced if production is continued in the near term at some level between those two extremes and if a high level of production is resumed sooner than the 1990 Mitre shut-in case. This observation simply reflects the principle that the calculated economic value loss decreases as the production level approaches MER.

Second, Table 2 above indicates a substantial surge capability can be achieved for the near term. Although it is beyond the scope of this paper to explore the costs of alternative strategic petroleum reserve systems, it is useful as a reference point to attempt a comparison of SPR costs with the NPR-1. For purposes of this example, figures are used from Case 4, where production is constrained to 25,000 barrels per day until 1985. That constrained production rate would withhold 145.3 MMB of NPR-1 crude oil from the market between 1982 and 1985. Of that amount, 62.8 MMB could be recovered in 1985 by increasing production to the maximum rate of recovery. The remaining 82.5 MMB of deferred production would be recovered over the lifetime of the Reserve.

By comparison, had the 145.3 MMB withheld from production gone into the Strategic Petroleum Reserve, all of it could have been drawn down in 1985. The present value loss for the SPR case, therefore, is only $978 million. To this cost must also be added SPR construction, figured conservatively at $3.75 per barrel, which increases the cost of the 145.3 MMB SPR reserve another $545 million to a total of $1.5 billion.

The figures suggest the costs are the same order of magnitude for either NPR or SPR reserve surge capacity. One must return to the concept of "effective reserve", however, to calculate a true cost comparison. That concept integrates reserve size with drawdown/production rate. In this example, the SPR provides an effective reserve of 145.3 MMB, because all the petroleum stored can be drawn down in 1 year. The NPR provides an effective reserve of only 62.8 MMB, or the amount of surge capacity for 1 year. On a per barrel basis, then, the SPR surge capacity cost is roughly $10.48 per barrel, while the cost of the NPR surge capacity is $41.40 per barrel, as shown in the preceeding table and in Table 3 below.

Table 3

Cost Comparison of NPR-1 (Case 4) and SPR as Sources of Domestic Petroleum Surge Capacity

	Total Reserve (MMB)	Effective Reserve for 1-year Interruption (MMB)	Total Cost/ Present Value Loss ($B)	Cost/Present Value Loss Per Barrel ($/Barrel)
NPR, Case 4	145.3	62.8	$2.6	$41.40
SPR Comparison	145.3	145.3	$1.5	$10.48

Senator HUMPHREY. Fine. Thank you.

BASIS FOR PROGRAM OFFICE RECOMMENDATION TO SHUT-IN RESERVES

Captain Gilmore, will you give us the basic reasoning that led to your recommendation to shut in the naval petroleum reserves?

Captain GILMORE. Yes, I will, Mr. Chairman. That information is in the report which has been supplied. The initiation of our study began with a contract with the Mitre Corp. to do some background data-gathering analysis for us.

Once we had received that data, my staff started working on the paper itself, looking at all aspects of the particular issue.

Yes, we spent a considerable amount of time on the strategic aspects. We also looked at the economic aspects but did not place the emphasis on them that the administration later placed on that aspect.

One of our concerns in the program had to do with the strategic petroleum reserve. While its ultimate size is to be 750 million or perhaps 1 billion barrels of oil in storage for emergencies, at the current time, we have just over 200 million barrels in storage. At the time of the study, it was even less than that. This administration has proceeded vigorously in filling that reserve.

Our concern was that with the national need for military and civilian requirements identified at a much larger figure and with only a fraction of that in storage, that the NPR represented the only viable complement to that system, and that the surge capability that we could develop in the NPR's should be developed and held at least until the strategic petroleum reserve was more completely filled. That was one consideration.

Keeping a given amount of oil in the ground in reserve for emergencies, of course, is consistent with the historical use of the reserves.

I would say that we did not spend as much time as was later spent on the economic aspects because normally in emergency stocks you do not use those stocks for economic benefit, or balancing the budget, or whatever. The Strategic Materials Act has a specific statement in it that says that these materials will not be used for economic purposes, for example.

So, for this variety of reasons we looked, looked very hard at the strategic needs and how those needs would be satisfied with our total resources—both SPR and NPR.

For those reasons, and for the situation in the Middle East, the fact we rely very heavily on relatively insecure sources of crude oil imports in the developing nations—about 6 million barrels of oil per day—we recommended to the Assistant Secretary that Elk Hills, our large reserve, be reduced in production to about 25,000 to 30,000 barrels per day in order to maintain it in a high state of readiness so that it could be brought back on production at full capacity, at a surged capacity, an enhanced full capacity, within 90 days to respond to an emergency.

Then, for a year afterward we could produce an average of about 190,000 barrels of oil per day.

This complemented, or was a significant amount of oil compared with what SPR could produce, say, in 1983 or 1984 over a year's period of time.

For these reasons, a combination of factors, we recommended that Elk Hills be reduced.

For NPR-3 in Wyoming, we recommended it remain on production because of the low surge capability there and because of the fact that we have enhanced all recovery work that can, hopefully, help us to generate about 40 to 90 million barrels more of oil.

Basically, we recommended that Elk Hills be reduced in production, held in readiness, and NPR-3 be continued on production.

STRATEGIC PETROLEUM RESERVE

Senator HUMPHREY. The preference, then, expressed in your report—implicitly or otherwise—is that you would rather have the oil in the ground in the naval petroleum reserves than in SPR; is that what you are saying?

Captain GILMORE. No, I think that the SPR should be filled as rapidly as the administration, as the Department and the administration, can fill it. I think that is being done at the present time. But you can only fill at a certain rate and only construct new caverns at a certain rate, and there are some limits there.

As the Secretary indicated, the intent is to have that facility, or those facilities, filled by 1989. In the interim we are progressing toward the 750 million barrels in storage, but we are a long ways from achieving that.

That was one of the factors in my recommendation that we conserve the oil in the NPR, particularly in this interim period, to provide a surge that would complement the SPR in the event of any energy emergency, or embargo, or war.

Senator HUMPHREY. I am not sure I see your point. If you feel confident that the Defense Department can get supplies from SPR, then why not just go ahead and produce at the naval reserve and use the revenue to help fill SPR that much faster?

Captain GILMORE. Well, I am confident that the military can get their oil from SPR. But SPR is limited in the amount of oil it can supply.

In our report that we submitted to the Assistant Secretary we have a chart—which has been made available to you—which indicates an average surge rate in barrels per day in 1982 after a shut-in. We could produce 197,000 barrels per day, or a surge of 172,000; that is a surge above the 25,000 barrels a day.

By comparison, SPR would have a surge of 685,000 barrels per day over a period of 1 year. So, the NPR surge is a fair fraction, a fair percentage, of the SPR capability at that time.

Military needs, you indicated, would be about 500,000 barrels per day now. During wartime that would go up to about 1½ million barrels per day.

If you have a 2-million-barrel-per-day shortfall during an emergency, then what I am saying here is, our capability to meet that shortfall, using surge production from NPR and SPR, is about 857 barrels a day.

Senator HUMPHREY. In other words, you would prefer not to pump at the NPR until SPR is filled and able to surge at its full capability.

Captain **Gilmore**. I recommend that the administration give consideration to these views that dwelled significantly on the strategic aspects. We recommended that the fact that the SPR is not filled and does not have a large capacity at present be considered very thoroughly by the administration making a decision.

I must say, Mr. Chairman, that the recommendations contained in the report were discussed at length with Mr. Vaughan's predecessor and I did have an opportunity to discuss these issues when the matter was presented at the Under Secretary level.

Senator **Humphrey**. Good. I am not trying to get you into a tight spot.

Captain **Gilmore**. Thank you, sir.

ROLE OF THE OFFICE OF NAVAL PETROLEUM AND OIL SHALE RESERVES

Senator **Humphrey**. In your capacity as commanding officer of the Naval Petroleum Reserves, in making your recommendation, do you get involved in strategic matters or is it just technical matters that have to do with the reserves themselves—geological matters, transfer or migration of reserves, and things like that? Or is it your responsibility in making your recommendation to get into strategic matters as well?

Captain **Gilmore**. I would answer that, "Yes." I think that I and the office that I head do a lot more than just produce the oil. We have responsibility to look at the world situation, military situation, and advise on those matters as we see them.

[Additional information follows:]

THE OUTLOOK FOR WORLD OIL SUPPLY AND DEMAND THROUGH 1982 (MMB/D)

	1980		1981					1982				
	4th quarter	Year	1st quarter	2d quarter	3d quarter	4th quarter	Year	1st quarter	2d quarter	3d quarter	4th quarter	Year
Production: [1]												
United States	10.5	10.7	10.7	10.6	10.6	10.6	10.6	10.5	10.5	10.4	10.3	10.4
Other developed countries	4.5	4.7	4.6	4.7	4.8	4.8	4.8	4.8	4.9	4.9	5.0	4.9
Non-OPEC LDC's	5.9	5.7	6.0	6.1	6.1	6.3	6.1	6.3	6.4	6.6	6.7	6.5
Net CPE exports	1.0	.9	.6	.6	.6	.6	.6	.3	.3	.3	.3	.3
OPEC	25.1	27.9	25.8	25.6	26.2	26.9	26.1	25.9	26.8	27.2	27.7	26.9
Total	47.0	49.9	47.7	47.6	48.3	49.2	48.2	47.8	48.9	49.4	50.0	49.0
Consumption: [1]												
United States [2]	17.4	17.3	18.1	16.4	16.6	17.8	17.2	17.9	16.5	16.6	17.8	17.2
Western Europe	13.9	13.7	14.0	12.3	12.2	13.9	13.1	14.2	12.3	12.3	14.0	13.2
Japan	5.3	5.1	5.4	4.5	4.4	5.3	4.9	5.5	4.6	4.5	5.4	5.0
Others	13.1	13.2	13.1	13.1	13.1	13.5	13.2	13.4	13.4	13.4	13.8	13.5
World (excluding CPE's)	49.7	49.3	50.6	46.3	46.3	50.5	48.4	51.0	46.8	46.8	51.0	48.9
Inventory change	−2.7	+.6	−2.9	+1.3	+2.0	−1.3	−.2	−3.2	+2.1	+2.6	−1.0	+.1
End of period inventories (billion barrels)	5.38	5.38	5.11	5.23	5.42	5.30	5.30	5.01	5.20	5.44	5.35	5.35

[1] Includes NGL and processing gain.

[2] Includes U.S. territories.

Senator HUMPHREY. I see.

Captain GILMORE. I believe the reserve was originally intended to be an emergency source of fuel for the military. The 1976 act expanded that mission so the reserves can be used in the event of an embargo for industry-related safety problems.

But I think we do have the prerogative to analyze and discuss strategic matters. We consult and work with the Office of the Secretary of Defense on these issues and talk to others that are concerned with the same matters.

Mr. VAUGHAN. Senator, I think it is fair to say that part of the captain's mission is to be an in-house, very visible, representative of matters military. He, I think, clearly has done that and done it well. That is an important part of his job in addition—in my judgment, and as I understand the law—in addition to technically running the operation.

DOE'S RELATIONSHIP WITH DOD

Senator HUMPHREY. How, then, does your office interface with the Secretary of Defense for Logistics and Materiel Management? My impression was that Captain Gilmore's responsibilities were technical in nature, but now I see that he has strategic and policy responsibilities as well, at least in terms of making recommendations to his superiors.

How does all that fit in with the responsibilities of the Secretary for Logistics and Materiel Management?

Mr. VAUGHAN. We, at my level and at Captain Gilmore's level, work very closely with the defense fuel people and the Deputy Assistant Secretary of Defense for Logistics in their fuel concerns, their fuel needs. That is how we plan to use things like the Defense Production Act, how we would plan to use these reserves.

Formally, the crossover point again occurs at the Cabinet Council where these matters are decided. As I described the process, the report went up from my chain of command to the Secretary who took it to Cabinet Council. After that deliberation or consideration the President made his decision.

I would point out again, you have built in the President himself a balancing of these interests since he has responsibilities as the Chief Executive Officer and also the Commander-in-Chief. So, he wears both hats concurrently.

I think these factors, both sides of the issue, were squarely presented to the President.

ROLE OF SPR

Senator HUMPHREY. Just one last question, Captain Gilmore. Then, your objection or reservation is that you would prefer to wait to become partners with SPR, if you will, until the other partner gets his assets up to something on par with yours. I am not talking about absolute terms, but you are ready to surge today and SPR is not, and you would prefer to wait until SPR is ready to surge. Is that a fair analysis?

Captain GILMORE. The Secretary might argue with you in that regard and I think we might argue with you on the point of whether or not SPR is ready to surge or not. It is a matter of how much surge can be provided over a period of time to satisfy a national energy emergency.

If the Nation needs 750 million in storage to protect ourselves sufficiently, and currently we have just over 200 million, then my position was—and has not changed—that the administration should look hard at conserving whatever oil it has available to it in this interim period until the SPR is filled to a greater degree.

As a matter of fact, Congress had some concern there and they indicated in the Energy Security Act that basically NPR-1 cannot be produced if the SPR is not being filled at a rate of at least 100,000 barrels of oil per day on an annualized basis.

So, the Congress itself says, "Fill SPR, let us get it filled," and I think that same stipulation applies until SPR has about 500 million barrels in storage. So, Congress said, "It is so important to get SPR filled at least up to 500 million barrels, if you do not do that, NPR-1, Elk Hills, will be shut in."

There is some point in time that the risk is less, some point in time when the SPR is filled, when the risk will be less. As I said, now with only 210 million or so in storage we are quite a ways from getting to the ultimate capacity of the facility. I recommend that the administration just look hard at whether or not we should conserve Elk Hills that does have some surging to complement the SPR.

Mr. **VAUGHAN**. Senator, could I add to that?

Senator **HUMPHREY**. Yes.

Mr. **VAUGHAN**. About the reactive capability of the Strategic Petroleum Reserve. At the time the captain prepared his report, his basic data he was looking at was under the previous administration which had not put as much as even 100 million barrels into the reserve.

In less than a year, in quite a bit less than a year, this administration has already more than doubled that. We have gone well past the 200-million mark and very shortly after the turn of the year we will pass the third point.

Concurent with that we are creating the capacity to store additional oil. So, every indication is that the SPR has and will have an increasing response capability. Today, I believe it is fair to say it has a surge capability of something well in excess of 1 million.

Senator **HUMPHREY**. I am glad that it is so, certainly we have been doing better. But certainly, also, the filling of SPR has been a very checkered experience and it could "checker" the wrong way in the future after we have used up a good bit of our Naval Petroleum Reserves; that is my concern.

PLANNING ROLE FOR THE PROGRAM OFFICE

Captain **GILMORE**. Mr. Chairman, may I make one comment?

Senator **HUMPHREY**. Yes, of course.

Captain **GILMORE**. That might clear up the matter of our planning. The reserves in title 10, United States Code, chapter 641 says, "Reserves will be used for national defense purposes," and then "national defense" is defined.

It says:

> National defense includes the needs of and the planning and preparedness to meet essential defense industrial and military emergency energy requirements relative to the national safety, welfare and economy, particularly resulting from foreign military or economic actions.

So, there is a specific requirement that we do planning. I am assuming that includes strategic planning.

CONTINUED NPR PRODUCTION REDUCES OIL IMPORTS

Senator HUMPHREY. Mr. Secretary, again going to the point that using from the NPR helps to reduce our import of foreign oil, that is about 6 million barrels a day if I am not mistaken, 6 to 7 million, I guess. We are producing about 180,000 barrels per day at the NPR. That has really a rather minimal impact on our imports, does it not?

Mr. VAUGHAN. It is not a major impact, Senator, but it is part of this administration's view that we should use every technique available to us to utilize low-cost production at home, as opposed to importing from abroad. This is part of that.

There is no intent to say that this is a major impact on import reduction.

Senator HUMPHREY. And you say that the production at NPR reduces our balance of payments by about $2 billion; is that correct?

Mr. VAUGHAN. It is $2.17 billion per year when you compare continued production to shutting in.

Senator HUMPHREY. Do you know what our total balance is?

Mr. VAUGHAN. I do not have it readily available, I certainly can make the comparison.

Senator HUMPHREY. I imagine $2 billion is a rather small part of that, it may be 5 percent.

Mr. VAUGHAN. I can only say, Senator, I think $2 billion is still a lot of money.

Senator HUMPHREY. Yes, I would like to retire on $2 billion. [Laughter.]

CONTINUED PRODUCTION PROVIDES FEDERAL REVENUES

Senator HUMPHREY. But in the overall context—I am just trying to make the point and it is only my opinion here—the real thrust to continue production, the real rationale is to provide some revenue to help us with the budget.

I know you do not agree with that, but that is my analysis of the situation because it really has very minimal impact on our import of foreign oil and a relatively small impact on our balance of payments; that leaves production of revenue. Five billion is a lot in that sense.

Mr. VAUGHAN. Yes, sir. In no way would I try to indicate that is not important, that is very important because that revenue, as I pointed out earlier, can have an impact on defense needs. This budget—as you know much better than I—can be used for a variety of purposes and they all create, as you strain it, pressures that can cut out defense needs or any other needs.

So, to the extent that we help the situation it seems to me we enhance our security.

INITIAL PERIOD OF PRODUCTION

Senator HUMPHREY. Do you know, Mr. Secretary, how the initial period of 6 years happened to be chosen? What is magical about that number, and what is magical about an extension of 3 years?

Mr. VAUGHAN. Senator, I do not think there is anything magical about it. I think that the Congress in changing the direction of the use of the NPR—and this is only my personal analysis—decided that the experience we had just gone through warranted changing that for 6 years and might warrant further extensions. So, it provided a mechanism, first the 6 years and then for extensions, and in typical fashion in this Government, provided checks and balances.

That check and balance is that either House can override or veto the President's decision, and the requirement that the President report to you what he intends to do, what his decision is, and allow you the opportunity to exercise your will. That is where we are.

COST OF SHUTTING IN THE RESERVES

Senator HUMPHREY. On page 7 of your testimony there is a passage which I do not understand. It says:

> Our analysis reveals that if severe supply interruptions happened in 1985, shutting-in NPR now would produce greater benefits in the interruption period, although not enough to offset the costs of a shut-in action.

What are those costs?

Captain GILMORE. Mr. Chairman, I can comment on that.

In going through the economic analysis—and I am not a real economist but I have learned a lot about the economic issues in the course of working on this paper—basically, when you shut in a reserve you incur costs as a result of deferring revenues. It does not mean those revenues will not be received by the Federal Government at some point, but by deferring the time of receipt you are reducing the present value for the stream of revenues.

Senator HUMPHREY. So, we are talking about all the things that we just discussed a moment ago, the reduction in imports, balance of payments, and so forth.

Captain GILMORE. Yes. If you shut-in this reserve, you will be importing more crude oil. The price of all oil in the world would theoretically go up slightly. Also, you are deferring revenues to the Federal Treasury. There is just a number of economic costs that are incurred or could be incurred when you shut-in. Most of those are addressed in specific terms in the President's paper.

In our comparison of these costs between what we would incur to shut it in and what SPR would incur in the normal course of establishing its reserve, the present value loss for both is a significant factor.

The loss for the SPR is less because it can come on production and discharge all of its oil during the course of a year. By comparison the NPR would only recover in a year about half or maybe a little more than half of the oil that you did not produce or deferred producing during the 3-year shut-in period. The rest of it would be recovered over a lengthy period of time.

So, your present value losses are more significant with the NPR than they are with SPR. But the other cost factors are very similar. They vary by degree of magnitude, of course.

NPR PRODUCTION RATES

Senator HUMPHREY. Mr. Secretary, your testimony on page 7 at the bottom. "If we do not produce further, that will result in a net production increase of 50,000 barrels per day." We are presently producing 180,000 barrels per day which is maximum efficient rate.

If we go ahead and grant another 3 years, does that mean that after that period if we are going to produce it at the maximum efficient rate then we will only be able to produce at about 130,000 barrels a day; is that correct?

Mr. VAUGHAN. I am not sure I understand your question, Senator.

Senator HUMPHREY. I do not blame you. [Laughter.]

You say that the strategic value of shutting in NPR would result in a net production increase of 50,000 barrels a day on an annual basis.

Is that not another way of saying that if we produce over the next 3 years we are going to reduce our capability by 50,000 barrels per day?

Mr. VAUGHAN. As Captain Gilmore has indicated to you, this reserve has passed its peak, it is on a decline curve. There is nothing we can do to change that.

Senator HUMPHREY. I understand.

Mr. VAUGHAN. We are saying the incremental benefit in surge capacity is only 50,000 barrels on the average.

Captain GILMORE. Your comment actually was basically correct in that if we continue to produce, by 1985 we will be down to, probably, 130,000, 140,000 barrels per day if we stay on production at the maximum efficient rate.

If you shut in the reserve in April 1982 and then come back on in 1985, 3 years later, for a 1-year emergency—and assuming that we continue our development program in the meantime—theoretically you could come on at that time at about 280,000 barrels per day.

Our facilities at Elk Hills are only designed to handle about 200,000 barrels per day, and this higher rate that I referred to could not be sustained for any period of time.

So, you would come back on, go up from a level of about 25,000 barrels to about 200,000 or 197,000 barrels per day and sustain that for about 1 year, with a slight dropoff. If it went on for 2 years, 3 years, certainly it would decay or decline after that period of time.

Senator HUMPHREY. Let me put it this way, we are producing 180,000 a day. If we continue over the next years and then go for a subsequent 3-year period, we will only be able to produce at about 130,000 barrels per day efficient rate. Is that about right?

Mr. VAUGHAN. It is roughly right.

Captain GILMORE. Yes, it would be about 130,000 or 140,000 barrels per day in 1985, and it would decline further from that as time goes on.

Senator HUMPHREY. So, the effect on the reserve then is not only, obviously, a reduction in the proven reserves, but also a reduction in daily flow, maximum efficient production.

Captain GILMORE. That is correct.

Mr. VAUGHAN. Once you start on that decline curve, Senator, in any oil reserve, from then on the maximum efficient rate declines. That is what the decline curve will force on you. It is just a characteristic of that kind of resource and its production.

NPR SURGE CAPABILITY

Senator HUMPHREY. In this matter of surge capability—can you discuss, Captain Gilmore or Mr. Secretary, just what scenarios are, in numbers, for surge capability?

How much of a surge capability is likely to be needed and is not a steady supply as important as surge capability?

Captain **Gilmore**. Let me comment on that, Mr. Chairman. I think surge capability, very high initial surge is very important from a military and an economic standpoint. If we have an embargo and the administration considers that the price of oil will go up dramatically because of the embargo, if you can, through using the SPR, or NPR, any resources available to the Government, put a large amount of petroleum on the market at that time to keep those prices down, from an economic standpoint you avoided a tremendous loss, from a gross national product standpoint.

So, as far as the economic situation is concerned, at the outset or onset of an embargo it is important to have surge available at that time.

In a military situation I think probably both surge capability and steady supply would be important. It depends on how long the war is going to last. There are emergency military supplies available initially, in the event of a war. Then those supplies, of course, will have to be replenished over time.

So, if it is a 1-year war, you have to have enough oil to fight the war. Admittedly, the Defense Production Act can be invoked and the amount of petroleum required to fight the war can be taken. But with limited resources, depending on what resources are left, those have to supply the needs of defense-related industry and other needs in the United States for the duration.

Mr. **Vaughan**. Senator, I think from what I have learned about this subject from a strategic point of view, surge capability is important. It is important to be able to furnish the amount of fuel quickly. As I understand—and I encourage you to pursue this line with the subsequent witnesses from defense—is the quickness of the response in their planning that is very important.

You have to keep in mind, we are talking about oil that is in the ground. So, it has to be produced and then sent to a refinery to be made into the product. In the case of SPR we are storing crude oil that can be very quickly shipped to a refinery. We have no natural forces to bring back on stream, we have no facilities to bring out of mothballs, and that sort of thing.

In the testimony, you will see that we say 90 days to bring the field back into production. In my judgment, Senator, 60 to 90 days is the best possible set of circumstances, everything has to work just right.

Senator **Humphrey**. Yes.

Mr. **Vaughan**. My fear is that, given shut-in for a few years—and Captain Gilmore is the source of the 60 to 90 days, I do not really argue with it—my fear is, however, that his assumptions for 60 to 90 days that we maintain it at ready condition, manpower, equipment.

Based on the history of what has happened in the past with things of this nature that have been put into stand-by capacity, there is a substantial danger, I think, that the funds will not be appropriated to keep employees on site, to keep the equipment completely mothballed in such a state that it can respond in 60 to 90 days.

Senator **Humphrey**. Are you saying the administration would not request funds for that?

Mr. **Vaughan**. I am not saying that, but I suspect it would get a rough bill, budget-wise, at the time.

Senator **Humphrey**. I do not understand that. On the one hand, the administration is perfectly willing to provide the staff and the operations and maintenance budget, providing we are selling off our assets, but on the other hand, they are not willing to provide an O. & M. budget to maintain those assets.

Mr. VAUGHAN. I can simply point out, Senator, that to have something stand by and not be utilized in times of tight budgets is a tough proposition to chin.

Senator HUMPHREY. Of course, we do that with a lot of strategic materials, and SPR is an example.

NPR PRODUCTION AS A SOURCE FOR THE SPR

On page 8 of your testimony, the bottom paragraph, you make the point that, "NPR production has served as a partial and indirect source of supply for SPR and in meeting Department of Defense fuel requirements."

Regarding that first element, source of supply for SPR indirect, partial and indirect, what do you mean by that?

Captain GILMORE. May I answer that, Mr. Chairman?

Senator HUMPHREY. Yes.

Captain GILMORE. When SPR fill was started again just a little over a year ago, the Government used NPR crude to initiate the fill. We transported by pipeline 10,000 barrels of oil per day for a short period of time and restarted SPR fill in that manner.

Subsequent to that, for about the last year, we have used NPR crude to obtain, through exchanges, oil for SPR fill at the rate of about 100,000 barrels of oil per day.

Senator HUMPHREY. I have heard the argument made that by selling off NPR oil we raise funds with which to buy oil for SPR, is that what you are trying to say here, Mr. Secretary.

Mr. VAUGHAN. That is essence is in part what you are saying there. When Captain Gilmore referred to exchange, you never ship oil physically from one place to the other if you can avoid it, if you can just trade it and avoid the transportation. That is the technique that has primarily been employed.

Senator HUMPHREY. My understanding is that SPR in 1982 is going to be funded with off-budget borrowing. I have not heard anyone mention anything about the amount of that borrowing by the projected revenues from sales of NPR oil.

Mr. VAUGHAN. We are going off-budget in 1982 and of course our commments have been, as we talk about what has happened and how it got started there historically from this point past.

SALE OF NPR OIL TO THE DEPARTMENT OF DEFENSE

With respect to the NPR as used in the future, I should tell you also that the Secretary of Defense has requested —the Energy Security Act permits and he has formally requested—that NPR production be designated for the Department of Defense, and there has been a Memorandum of Understanding signed between the two Secretaries of Defense and Energy to accomplish that fact. It will be fully accomplished by approximately next April.

We have already had one test run at the request of the Department of Defense in that regard.

Senator HUMPHREY. In the same sentence you state that NPR production has been an indirect source of supply for the Department of Defense fuel requirements. You are bartering some of that production, is that correct?

Mr. VAUGHAN. That is the test run I referred to, Senator. The Defense Fuel Supply Center has received a certain portion of the crude production and they have swapped that with oil refiners for the desired product, I believe it was jet fuel in the particular test run they made. So, it has been bartered.

Captain GILMORE. If you want more detail, Mr. Chairman, on the specifics of that, effective the 1st of July we sold all of the NPR-3 crude to the Department of Defense, about 3,500 barrels per day, and about 500 barrels per day of condensate from NPR-1 Elk Hills.

Effective December 1, DOD is scheduled to get another 34,000 barrels per day from Elk Hills. Effective April 5 of next year, DOD plans to be purchasing all of the Government's share of NPR crude.

Senator HUMPHREY. How do you decide on a price?

Captain GILMORE. The price has been set as the average of the three highest posted prices for comparable crude in the vicinity of the fields where crude is being sold.

Senator HUMPHREY. Has the Department of Defense ever had access to NPR oil at cost?

Captain GILMORE. Not to my knowledge, Mr. Chairman. The law provides that DOD will pay fair market value for the crude.

Senator HUMPHREY. What is the cost of production per barrel?

Captain GILMORE. The cost?

Senator HUMPHREY. Total cost.

Captain GILMORE. We were selling the crude at Elk Hills for about $30 per barrel. Currently, the cost to produce that, I guess when you include amortization of facilities and all costs, it would probably be around $5 or $5.25, $5.50 a barrel. It is a relatively good investment.

Senator HUMPHREY. Are we paying a windfall profits tax on that?

Captain GILMORE. We do pay. The first purchaser is the one who really pays. But windfall profits are paid on all NPR crude.

When we receive the revenues, or when the Treasury does, part or the bulk of the income goes into general receipts and part goes into the windfall profits tax account.

Senator HUMPHREY. What is the California development program, Captain?

CALIFORNIA DEVELOPMENT PROGRAM

Captain GILMORE. That program was put together back in 1976, as I recall, and encompassed the major facilities necessary to develop the Elk Hills petroleum reserve to its maximum production capacity.

The current total estimated cost of that program is $366.2 million. We will be receiving appropriations, I think, up to $361 million through fiscal year 1982. The last $5 million was going to come in fiscal year 1983. We do not intend to ask for additional funds to complete that development program which will be essentially complete by the end of this fiscal year at a cost of $361.2 million.

Some of the major facilities which already have been built—about 85 percent of that program is complete today—are two 100-million cubic feet per day gas processing plants, major injection compression plants, crude-oil storage facilities, pipeline facilities, and just the general facilities required for a major oil field the size of Elk Hills.

ELK HILLS EXPLORATION PROGRAM

Senator HUMPHREY. I read somewhere that 20 percent of Elk Hills is yet to be explored.

Captain GILMORE. Yes, sir, that is correct.

Senator HUMPHREY. Can you make a professional estimation on what might be found? Is that possible?

Captain GILMORE. Well, we are hopeful that we find several tens of millions or hundreds of millions of barrels of additional oil. The program has been reasonably successful over a period of time. We continue to explore at the rate of about four wells per year, that is about the number that we can evaluate.

Our geologists do a pretty good job. It is just a matter of drilling a hole, evaluating the data and moving to the next location, building on what you have learned in the past.

We have discovered additional pools and I would be happy to supply for the record the specific details of those additional discoveries. But we have added tens of millions of barrels of reserves to the overall Elk Hills Reserve through our exploration program.

Senator HUMPHREY. You have about 970 million barrels there now, and you think in your professional opinion that there is a reasonable possibility we might find several hundred million barrels more; is that correct?

Captain GILMORE. There is an excellent possibility that we will find tens of millions of barrels of additional oil.

Senator HUMPHREY. And what would be the prospect of finding hundreds of millions?

Captain GILMORE. Well, you go to a risk analysis. I guess I would rather ask my professional geologists at Elk Hills. But it is a very large area; we have about 47,000 acres at Elk Hills alone, with very complex geology. The investment in exploratory work in the past has paid off extremely well. Certainly, that should be continued.

If you would like an estimate of what my geological staff at Elk Hills thinks is the amount of oil yet undiscovered there, I would be glad to supply that.

Senator HUMPHREY. Yes, I wish you would, for the record. How much had been explored as of, say, 10 years ago. Has there been an active exploration program?

[The information follows:]

In 1974, Congress approved a total capability development and exploration program for Naval Petroleum Reserve No. 1 (NPR-1), which was to provide for the assessment of the resources and development of producing capability. Subsequent to that approval, 24 exploratory wells have been drilled through fiscal year 1981, while 2 additional wells are currently being drilled, and 4 more are scheduled for fiscal year 1982. Of the 24 exploratory wells, 12 were successfully completed and credited with adding approximately 24 million barrels of crude oil and 115 billion cubic feet of natural gas reserves.

Until an exploratory well is drilled and the corresponding acreage is proven or condemned, no reliable estimates of reserves can be made. However, an evaluation of the geological data indicates that areas within NPR-1 yet to be drilled may contain up to 300 million barrels of oil equivalent.

Captain GILMORE. There has been a relatively active program, Mr. Chairman, but in some fiscal years, money would not be provided because an exploratory program may not necessarily generate revenues that particular year. So, it is an item that sometimes has been dropped off in budget cutting.

Senator HUMPHREY. They were making quite a lot of money in selling the oil. It is not being re-invested in further exploration on a significant scale?

Captain GILMORE. Well, there is no direct re-investment on the revenues. We have to come before the Appropriations Committees and the Armed Services Committee to support our requirements. The last couple of years we have been supported and do have exploratory funds. We hope that would continue.

Senator HUMPHREY. By what date would you project we will have fully explored Elk Hills, that last 20 percent?

Captain GILMORE. If we continue the current exploration of about four wells per year, I would guess within the next 5 years we would have it completely explored.

Now, at NPR-3 in Wyoming, we have essentially done that, although from time to time with new information, we will drill one or two exploratory wells.

Mr. VAUGHAN. Senator, you have asked several questions here about the program of development. I think it is fair to say that this reserve historically was just a land holding that had oil potential and had some known reserve, relatively unexplored. It was held by the Government, simply not used. A tract of land not used, set aside, until essentially for some limited production during World War II and as soon as the war was over, it was shut in.

What has happened after 1976 was a significant program for development. At page 4 of my testimony are the specifics: 29 exploratory wells, 913 development wells.

So, we are really looking at a lot different shut-in now. All that equipment, productive capacity did not exist before. Now the proposal would be to shut that in as well as the gas processing plants and so on, that Captain Gilmore referred to.

So, we are talking about quite a bit different plant, so to speak, to shut in and have on "standby" which we did not have in the past.

Senator HUMPHREY. I understand, there is a difference in development.

DISMANTLING THE ENERGY DEPARTMENT

Mr. Secretary, what are your thoughts in the event that the Department of Energy is dissolved with respect to management of the NPR?

Mr. VAUGHAN. Senator, I have made some recommendations to the Secretary, and he is committed to have recommendations to the President 2 months in advance of the sunset provisions of the law that created the Department. In other words, roughly the end of November.

I think it would be a little bit presumptuous for me to detail my recommendations to him since that will eventually come out as a Presidential initiative.

Senator HUMPHREY. Yes.

Mr. VAUGHAN. However, there are some alternatives—I will be glad to list them for you—that were considered. It is certainly the obvious, return it to the Department of Defense. The Department of Commerce was considered. The Department of the Interior was considered, and the Federal Emergency Management Agency was considered. All of those were considered as possibilities as a home for the Strategic Petroleum Reserve and the Naval Petroleum Reserve.

Senator HUMPHREY. What is your opinion on that, Captain Gilmore?

Captain GILMORE. I have a fondness for the Navy, Mr. Chairman. [Laughter.]

We once worked for the Secretary of the Navy and if there is going to be a reorganization, I would not object at all to such an arrangement in the future.

LOSS OF RECOVERABLE RESERVES AT ELK HILLS

Senator HUMPHREY. What about reserve migration? If we shut in Elk Hills, how great is that risk and how much are we likely to lose?

Captain GILMORE. I think you will probably get different opinions on that as you interview other witnesses, but let me just state this, Mr. Chairman, that the oil migration in the Shallow Zone at NPR-1 was a problem that was encountered prior to the time of us going on production in 1976. I do not know when it initially started, but it was evaluated, analyzed, by a team of Government engineers and Chevron engineers, and suitable measures were taken in order to preclude a loss of oil.

I would be hard pressed to say there was no oil lost. But to say that there were substantial quantities of oil lost, I think, would be an overstatement of the situation.

There are a number of engineering considerations which must be addressed in a producing situation or in a shut-in situation, and we have the engineering committee at Elk Hills to address those issues and to resolve them in some manner.

Our estimate of production required if we did shut the reserve in—just from a technical standpoint—that would be about 8,000 barrels per day. Now, Chevron may disagree with that, they may have another figure. But there is a mechanism to sit down and look at these from a purely engineering-technical standpoint and resolve them. We are able to do that with Chevron on many issues that arise.

Senator HUMPHREY. You are saying, then, that the problem of oil migration can be largely controlled; is that right?

Captain GILMORE. It has been in the past, in my opinion and in the opinion of my staff at Elk Hills. In our opinion, it can be done so in the future.

Senator HUMPHREY. But the problem becomes more challenging the more oil you have removed; is that correct?

Captain GILMORE. I do not know if it would be more challenging. You have less oil to move off, I would presume. So, I think the problem can be accommodated now as well as it could in the past.

Senator HUMPHREY. But I am talking about the future. If we go ahead now and produce for another 3 years, does that not complicate the problem of oil migration?

Captain GILMORE. I do not know if it would really complicate it, Mr. Chairman. We actually would have less oil left underground. I do not think the problem would be much more complex because of production or lack of production.

It is a pressure problem with water encroachment on the north flank of a structure, of a reservoir which requires removing water from the north flank and injecting it on the south flank to maintain stability within the reservoir.

Senator HUMPHREY. So, you are saying that further production does not, at least at Elk Hills, increase the potential for oil migration; you can control it.

Captain GILMORE. I do not know that it would, Mr. Chairman.

RECOVERABLE RESERVES AT ELK HILLS

Senator HUMPHREY. The 970-million reserve, will that change? Is that based on continued production at Elk Hills?

Captain GILMORE. That figure is what we have today, and as we continue on production that figure will decrease, continue to decrease. We are producing about 175,000 barrels per day. The remaining recoverable reserves will just continue to be less day after day until they are depleted.

Senator HUMPHREY. Yes, I understand that. But if you shut it in, will that 970——

Captain GILMORE. Oh, it will stay the same. If it were to be shut in, in April, whatever the exact figure is at that time, the remaining recoverable reserves would stay the same until the field is placed back on production again.

Senator HUMPHREY. I think other witnesses probably do not agree on that, and I wanted to get your opinion.

NAVAL OFFICERS IN THE RESERVES PROGRAM

Captain Gilmore, does the Navy have an ongoing training program to bring along officers to take your position, to complement your people? Is the Navy convinced that it is going to have this responsibility and is preparing people for future roles?

Captain GILMORE. Yes, sir. We always keep somebody ready to take the Director's position. We do have a training program at the University of Texas in Austin where we can enter Civil Engineer Corps officers with varying degrees, including bachelors in petroleum engineering, but more likely bachelors in civil and mechanical engineering, or some other field. They can obtain a master's degree in petroleum engineering after about 1 year to 1½ years of study.

The program has been an excellent one; it produced some very fine petroleum engineers. Currently, I believe, there is one officer in it; generally, that is the case. Occasionally, we will have two at a time. But we are getting trained officers through that program. That is in addition to ones that may enter the Civil Engineer Corps with a bachelor's degree in petroleum.

Currently, we have three naval officers assigned to the program, myself and two petroleum engineers in the field, one at Elk Hills and one at Casper. I have requested additional officers for the program, additional petroleum engineers.

Senator HUMPHREY. So, the Navy is assuming that it is going to have this responsibility for some years to come and has a serious training program; is that what you are saying?

Captain GILMORE. Yes, that is what I am saying. That training program at the University of Texas may have to be increased. I have not discussed this with them specifically, but it may well have to be increased, particularly if they approve my request for additional military officers.

Senator HUMPHREY. Very well. Secretary Vaughan, thank you.

Mr. VAUGHAN. Thank you, sir.

Senator HUMPHREY. Captain Gilmore, thank you very much.

Our next witness is Mr. Richard D. Webster, Deputy Assistant Secretary of Defense for Logistics and Materiel Management.

Sorry to keep you waiting, Mr. Secretary. You know how it is in the military, hurry up and wait. [Laughter.]

Without objection, your prepared statement will be inserted in the record. Will you summarize your testimony?

Mr. WEBSTER. Yes, Mr. Chairman; I would prefer to do that. We have submitted detailed testimony for the record but I would like to summarize a few of the more important points made.

Senator HUMPHREY. Before you begin, if you will for the record identify your assistants.

Mr. WEBSTER. Yes. To my right I have Mr. William Sharkey, Director of Energy Policy in the Office of the Secretary of Defense, who reports directly to me.

To my left I have Rear Adm. William Ryan, Commanding Officer of the Defense Fuel Supply Center over at Cameron Station. It is part of the Defense Logistics Agency which again reports to the Assistant Secretary for Manpower, Reserve Affairs, and Logistics.

Senator HUMPHREY. Fine, thank you.

[The prepared statement of Richard D. Webster follows:]

PREPARED STATEMENT OF RICHARD D. WEBSTER, DEPUTY ASSISTANT SECRETARY OF DEFENSE, LOGISTICS AND MATERIEL MANAGEMENT

Mr. Chairman and members of the Subcommitee, thank you for this opportunity to present the Department of Defense (DOD) views on the continued production of the Naval Petroleum Reserves (NPR's). I am Dr. Richard Webster, Deputy Assistant Secretary of Defense for Logistics and Materiel Management. Rear Admiral William J. Ryan, Commander, Defense Fuel Supply Center and Mr. William J. Sharkey, Jr., Director for Energy Policy in the Office of the Secretary of Defense are accompanying me today.

By way of overview this morning, I will discuss: DOD Energy Use; DOD energy management priorities for FY 1982 which are: Fuel supply assurance, Petroleum logistics improvements, Energy considerations in weapons systems development, and Energy considerations in weapons systems development, and Energy conservation and management initiatives, and the rationale for DOD's support of the President's decision to continue production of the NPR's beyond April, 1982.

DEFENSE ENERGY USE

The Department of Defense is the single largest energy consumer in the United States. Fiscal year 1981 DOD energy costs exceed $10 billion and represented more than five percent of the DOD budget. Based on data for the first three quarters and our projections for the fourth quarter, DOD consumed an equivalent of 238 million barrels of oil in 1981. This amounts to just less than two percent of national energy consumption and 80 percent of Federal sector energy consumption. For example DOD consumes 50 percent of the motor gasoline, 85 percent of the heating oil, and nearly 100 percent of the jet fuel in the federal government. DOD is dependent heavily on petroleum fuels, which represent more than two-thirds of our total energy consumption and 75-percent of our total energy costs. Energy is central and critical to the operational readiness of the strategic and tactical forces. Effective management of defense resources is essential to successful accomplishment of the defense mission.

DEFENSE ENERGY PRIORITIES—1982

For the past several years, we have developed annual energy management priorities which provide an effective framework to manage the costly and vital DOD energy program. Our energy management priorities for fiscal year 1982 are based on an assessment of DOD's progress in energy management to date, longer term goals, and the most important next steps to achieve these goals. Each priority group reflects the areas which will need the most management attention in 1982.

Our first and most basic priority is to lessen DOD's vulnerability to national energy supply disruptions through the defense supply assurance program.

Second, it is essential that an infrastructure is firmly in place to handle adequately the flow of fuel during peacetime and war situations.

Third, we are working to incorporate energy considerations in the Defense systems acquisition process. We are developing the procedures and methodologies necessary to assure that energy considerations are integrated into life-cycle costing studies of new weapon and support systems before acquisition decisions are made.

Fourth, we will continue to stress energy conservation and management efforts. The cheapest, most available energy is that which we already have, but have avoided expending because of increased efficiency.

SUPPLY ASSURANCE STRATEGY

The old adage that an Army marches on its stomach has a modern equivalent: "The military moves on its fuel tank." The Organization of Petroleum Exporting Countries (OPEC) embargo of 1973 demonstrated forcefully US dependence upon oil with its uncertain sources of supply. Through the 1970s, the US experienced periods of energy shortages. The most recent, severe shortage period was between October, 1978, and March, 1980. During that 18 month period, Defense fuel inventories were reduced 12 million barrels below October, 1978, levels. That period of shortage and earlier shortages helped identify the following problems:

Uncertainty in crude oil streams for Defense refiners.

Excessive procurement regulations and paper work which discouraged refiners from doing business with DOD, and

Limited regulatory options available to resolve fuel problems.

To offset these problems, DOD had to develop a strategy to assure adequate energy supplies for the military services for periods of both peace and war. The result was a four point supply assurance program, under which:

We are securing long term control of US Government-owned crude oil. The major constraint our suppliers faced during previous shortages, and will face during future supply disruptions, is the lack of secure crude oil supplies. The solution to this problem has been our highest priority. The United States Government, through production of the NPR's and through royalty entitlements to oil produced on federal leases, controls a considerable volume of crude oil. Our intent is to have this oil transferred to DOD. We, in turn, will use the crude oil to enhance our leverage to obtain fuel from domestic refiners. From the DOD's perspective, this is a long term program that will insulate us in part from the vagaries in the marketplace. During supply disruptions, we will have to compete in the marketplace for only a portion of our requirements. Because our marketplace demands will be small, our ability to buy what we need, without the need for regulatory intervention, is enhanced. We have made considerable progress with this initiative:

We obtained commitments during FY 1981 from the Secretary of Energy for the transfer of approximately 138,000 b/d of crude oil from the Naval Petroleum Reserves.

The Defense Fuel Supply Center (DFSC) will award shortly contracts for the exchange of the first segment and will solicit bids on the remaining petroleum, which will become available next April.

We are negotiating with the Secretary of the Interior over access to Outer Continental Shelf (OCS) royalty oil. DFSC and the US Geological Survey are completing work on a draft interagency memorandum of understanding. If this action is completed successfully, DOD could acquire the rights to an additional quantity of approximately 30,000 b/d of government-owned oil located on the gulf and west coasts. This volume could be expanded substantially in future years.

Mr. Chairman, DOD supports the President's decision to continue production beyond April, 1982. Our rationale for this position is:

First, the NPR's are an important strategic asset, whether producing and thus reducing reliance on imports, or whether shut-in as a hedge against some future emergency. Hence, both options have merit.

Second, continued production of the NPR's would enable DOD to establish solidly our new program to secure domestic crude oil supplies. This strategy will make an important contribution to military readiness in the years ahead, particularly in periods of supply disruptions short of mobilization. We judge that supply disruptions of this type are extremely likely to recur during the 1980's. It is during such periods, rather than mobilization, when military requirements are most difficult to obtain, because of competing civilian needs. Experience of the 1970's bears this out.

Third, NPR's surge production would not be large enough to make a decisive contribution to military mobilization requirements, which could be three to four times as high as our peacetime needs. This nation must continue the excellent progress of the recent past to expand domestic energy production, improve energy efficiency, and build a large Strategic Petroleum Reserve (SPR). Our success in these areas, rather than whether the NPR's are shut-in or not, will determine the ability of this nation to mobilize in future crises.

Fourth, to resume production after shut-in would require presidential concurrence, a congressional resolution, and a 90-day production preparation and buildup period at the NPR's. This process is involved enough to pose real questions as to how responsive the NPR's surge option could possibly be in an emergency.

I would like to turn now to the remaining elements of the supply assurance program:

We are obtaining supply commitments for synthetic fuels from companies operating with U.S. Government financial assistance.

DOD is working in conjunction with the Department of Energy and the United States Synthetic Fuels Corporation to develop a commercial US synthetic fuels industry.

The Department of Energy recently signed synthetic fuel agreements with Union Oil Company of California (Union) and The Oil Shale Corporation (TOSCO) in July and August of this year. Under the terms of these agreements, each producer guarantees to supply 10,000 b/d of jet and diesel fuels to DOD for a 10-year period. Union will begin deliveries in 1983 and TOSCO in 1985.

We are attempting to simplify petroleum contracts to enable DOD to compete more effectively in the marketplace.

We are working to raise the ceiling for the application of the small purchase procedure in petroleum contracts from $10,000 to $100,000.

We have proposed legislation to give the Secretary of Defense authority to waive the application of various procurement statutes in periods of tight petroleum supplies.

We are working to perfect a regulatory framework that could be used, as a last restort, to allocate fuels to the military and Department of Defense contractors.

DOE published, in November, 1980, a regulation that spells out procedures to be used to invoke the Defense Production Act (DPA) to allocate petroleum supplies to the military. We are now staffing, within DOD, procedures DOE has proposed to allocate fuel to DOD contractors.

With DOE, we have tested these procedures on a limited basis, administratively. We anticipate that we could gather the data that the regulation requires and process the DPA invocation request to DOE in less than two weeks. DOE is reviewing the results of the test and working to develop procedures under which it can process expeditiously our request.

We have designed a political-military simulation game, called FUELEX-81, to test these regulations, particularly the decision process that would be required to invoke these regulations in a non-mobilization energy supply disruption. FUELEX-81 will be played next week. From the lessons of this exercise, we hope to develop decision criteria to guide officials in balancing the competing military, economic, and political considerations that would be involved. We would expect also to obtain an evaluation of the existing regulations and identify possible improvements.

In addition to these activities, we have launched a number of additional efforts to improve energy emergency planning:

We are working with DOE and the Federal Emergency Management Agency (FEMA) to gain a better understanding of industrial base energy requirements in mobilization.

At our request, the Industrial College of the Armed Forces (ICAF) is conducting a study entitled "Energy Issues in Mobilization." This study, in which 18 students will participate under the direction of a senior faculty member, will be completed this academic year.

We have launched a survey of NATO energy policy and planning initiatives to identify areas where we should push for improvements to enhance energy availability for military activities in the NATO theater.

That completes my discussion of our top priority, supply assurance. Our second priority is:

PETROLEUM LOGISTICS IMPROVEMENT

We are addressing the two major petroleum logistics issues: petroleum stockage, i.e., how much fuel do we need to stock; and petroleum storage policy, i.e., how do we store what we need.

On the stockage issue, we have developed and are now staffing the fourth iteration of a draft DOD directive that, on the one hand, considers:

The unique vulnerability of petroleum to supply disruption, and

The need for pre-positioned stocks worldwide to meet a variety of political and military contingencies.

And, on the other hand, considers:

The high cost of petroleum products, storage construction, and maintenance, and

The availability and reliability of host nation support to meet US military needs. The draft stockage policy basically follows the concept that in today's very uncertain petroleum availability environment, more is better (plus melius est), both for peacetime stocks and war reserves.

We are also working on a plan to resolve existing storage deficiencies and to meet the needs of our evolving stockage policy, using a combination of:

Leased tankage for near term fixes.

Military construction and NATO infrastructure programming for long term corrections, and

Host nation support arrangements as a cost avoidance mechanism, where it can be applied reliably.

I am pleased to report continued improvement in our petroleum stockage posture. Since February, 1980:

We have acquired, primarily by lease, several million barrels of additional storage capability, and

We have hardened a significant amount of storage.

Our third energy management priority is:

ENERGY CONSIDERATIONS IN WEAPON SYSTEMS DEVELOPMENT

I will not dwell at length on this initiative. It is a high priority area of emphasis, and springs from our concern that energy has not obtained the attention it deserved, either as a cost driver or readiness constraint, during the weapons acquisition process. We have caused DOD acquisition policy to require energy to be considered at each decision milestone, and to require logistics support analyses to include parametric energy cost estimates. We are developing procedures and methodologies to translate these policies into practice.

Our fourth priority area is:

ENERGY CONSERVATION AND MANAGEMENT

DOD is dedicated to achieve the national energy goals which the President and the Congress have mandated, to reduce energy dependence on insecure energy sources, and to reduce costs. Based upon the first three quarters of fiscal year 1981, we estimate that we have reduced facilities energy consumption 15 percent per square foot below the FY 1975 base line and the consumption of heating oil on our bases by 24.5 percent over the same period. Mobility energy conservation is designed to improve efficiency and productivity rather than to reduce absolute fuel consumption. We are getting, for example, more training per flying hour and steaming day. While we have increased operating tempos in recent years to increase readiness and to support Indian Ocean operations, our mobility fuel consumption is currently at approximately the same levels as in 1975.

CONCLUSION

Mr. Chairman, the two principal energy constraints that DOD faces are availability and affordability. The programs that I have described to you are targeted directly to reduce those constraints. NPR production is a major element of our program. I believe we have accomplished a great deal. Much more remains to be done, and I solicit your support in these efforts. Mr. Chairman, I would be pleased to answer any questions you may have.

STATEMENT OF RICHARD D. WEBSTER, DEPUTY ASSISTANT SECRETARY OF DEFENSE FOR LOGISTICS AND MATERIEL MANAGEMENT; ACCOMPANIED BY REAR ADM. WILLIAM J. RYAN, COMMANDER, DEFENSE FUEL SUPPLY CENTER; AND WILLIAM J. SHARKEY, JR., DIRECTOR FOR ENERGY POLICY, OFFICE OF THE SECRETARY OF DEFENSE

Mr. WEBSTER. It is a pleasure for me to be here this morning, Mr. Chairman, to discuss the Department of Defense views on continued production from the naval petroleum reserves, or the NPR's.

The Department of Defense is absolutely dependent on petroleum for readiness. More than two-thirds of the energy that the Department of Defense consumes is petroleum, and of that 90 percent is for mobility operations. The petroleum, I should point out, is used in a refined condition. The petroleum reserves are crude oil and have to be refined.

The DOD fuel bill is enormous, exceeding $10 billion per year. The vulnerability of petroleum supplies and their high costs present two major energy constraints that DOD faces, availability and affordability.

During the first oil embargo we had a very serious problem with DOD budgets because fuel price increases were not planned for. I think we have a better handle on it, but another situation like that could present a traumatic impact on a budget which is currently running $10 billion a year today.

To deal with these constraints, we have developed a series of management initiatives which are explained in detail in my formal statement. We have four. The priorities are:

First, fuel supply assurance. Again, I am talking about refined product.

Second, petroleum logistics improvements, i.e., how we can distribute petroleum, store it, preposition it in the worldwide DOD environment.

Third, energy considerations in weapons systems. As we start development of new weapons systems, we have included a requirement that energy consumption be a criterion upon which we evaluate that system.

Fourth, energy conservation and management initiatives, in our tactical and administrative vehicles, as well as in our bases and stations.

The most important of these initiatives, of course, is the fuel supply assurance program, because of the DOD worldwide mission.

I could point out here that we have to be prepared for not only a major mobilization requirement in more than one theater, but we also have to worry about the relatively small rapid deployments we might have to make in any specific country. This means instantaneous availability of refined product when and where we need it.

Between October 1978 and March 1980, the most recent period of shortage, defense fuel inventories were reduced 12 million barrels below the October 1978 levels. That period of shortage and earlier shortages highlighted the following problems:

We had uncertain crude oil streams for defense suppliers;

Excesssive procurement redtape discouraged refiners from doing business with DOD; and

Limited regulatory options were available to resolve fuel problems, and we talked about that earlier this morning.

To offset these problems, DOD developed a four-point supply assurance program.

First, we are securing control of U.S. Government-owned crude oil. The major constraint our suppliers face during supply disruptions is crude oil supply. The U.S. Government, through production of the naval petroleum reserves and through royalty entitlements on oil produced on Federal leases, controls a considerable volume of product.

We, in turn, will use this crude oil to enhance our leverage to obtain fuel from domestic refiners to insulate us in part from the vagaries in the marketplace.

I can say that we have made considerable progress with this initiative. We have obtained commitments from the Secretary of Energy for the transfer of approximately 138,000 barrels per day of crude from the naval petroleum reserves. In addition, we are negotiating with the Department of Interior to obtain access to some 30,000 barrels per day of Outer Continental Shelf royalty oil.

Mr. Chairman, DOD supports the President's decision to continue NPR production beyond April 1982. I might also add that since my appointment in July, I have had ample opportunity to review this decision internally with my own staff and with members of the Defense Logistics Agency, and I concur with that position.

First, the NPR's are an important strategic asset, whether producing and thus reducing reliance on imports, or whether shut-in as a hedge against some future emergency. Hence, both of the options do have merit. I think Captain Gilmore pointed that out this morning.

Second, continued production of the NPR's would enable DOD to establish solidly our new program to secure domestic crude oil supplies.

Third, NPR surge production would not be large enough to make a decisive contribution to military mobilization requirements which could be three to four times as high as our peacetime needs, and that would be just for the forces alone. If you would add industrial base requirements, it would be higher.

Fourth, to resume production after shut-in would require, in our opinion, a lengthy decision process and production preparation and buildup period at the NPR's.

Mr. Chairman, the continued production of the NPR's complements the remaining elements of our supply assurance program. We have obtained supply commitments for synthetic fuels, from companies operating within the U.S. Government financial assistance that now amount to 20,000 barrels per day of jet and diesel fuels for a 10-year period.

Also, we are attempting to simplify petroleum contracts to enable DOD to compete more effectively in the marketplace. In addition, we are working to perfect a regulatory framework that could be used as a last resort to allocate fuels to the military and Department of Defense contractors.

In that light, we have designed a FUELEX 1981 exercise which will include representation from not only the Department of Defense but other Federal agencies as well as our civilian industrial base. This exercise will test the decision process to invoke the Defense Production Act regulations in a simulated emergency, short-of-war, environment. We expect to obtain an evaluation of the existing regulations and identify possible improvements resulting from this exercise which we can use in future emergency situations.

This exercise, by the way, will be played next week. So, it was very timely that we had an opportunity to come and talk about it today.

In conclusion, Mr. Chairman, the two principal energy constraints that DOD faces are availability and affordability. The supply assurance program I have described is the most important of our programs to assure fuel availability. NPR production is a cornerstone of that program.

Mr. Chairman, I would be pleased to answer any questions you may have, and likewise Mr. Sharkey and Admiral Ryan.

Senator **Humphrey**. Thank you, Mr. Secretary.

Can you—for a little historical background—tell us what the effect was on the Department of Defense during the 1973 embargo and the period of tight supplies that lasted for some time beyond that?

Mr. **Webster**. I will have to answer that generally as an introduction. I do recall working with officers and the Secretary of Defense. The budget constraints were extreme and most of the senior executives were working practically around the clock trying to get additional budget money to make up for the price escalations that they had to face.

Mr. Sharkey, would you have anything to add to that, since you were around at that time?

Senator **Humphrey**. I can understand the economic problems, but what were the operational problems? That is really what I am getting at.

Mr. **Sharkey**. We were unable to buy all of the fuel that we needed, Mr. Chairman. We tended to find—and particularly in the 1979 crisis, which is what I am not familiar with, we were unable to buy all that we needed, even before the Iranian Revolution. We tended to find tightness in the market before other people. And we had problems long after the gas lines disappeared.

It was just very tight for us.

Senator **Humphrey**. Are you qualified to testify on the operational effect?

Mr. **Sharkey**. In 1979 we did not reduce the pace of operations. What we did was draw down inventories. So, we maintained readiness but we reduced sustainability.

Senator **Humphrey**. What is the ordinary situation, can you describe to me the ongoing fuel supply situation in the Department of Defense, where you get it, how much; what kinds of contracts you have; what the overseas sources of supply are, if any; what your reserves are, where, and so on?

Mr. **Webster**. Yes. The fuel supply situation is an everyday operation. Our Defense Fuel Supply Center is the contracting agency for this. They are dealing in the procurement of refined products.

There are requirements given them by the services for fuel supply which not only consider the amount and type, but the disposition of this fuel. So, the Defense Fuel Supply Agency is required to deliver this on a worldwide basis.

Admiral Ryan, would you like to expand on that?

Admiral RYAN. Only to this extent, our peacetime requirements are somewhere between 450 and 500 thousand barrels a day, that is for the entire Department of Defense.

Of that, the overseas portion of the requirement is between 150 and 200 thousand barrels, which leaves us with a domestic portion requirement——

Senator HUMPHREY. Are you talking about per year, or per day?

Admiral RYAN. This is per year, sir.

Senator HUMPHREY. Will you give us those figures again, please?

Admiral RYAN. I beg your pardon, this is per day. It is 484,000, our best estimate of the peacetime consumption of the Department of Defense.

Senator HUMPHREY. Thousands.

Admiral RYAN. Of product, yes, sir. That is 484,000 barrels per day. Of that, approximately 150,000 to 200,000 are overseas requirements which leaves us a balance of roughly 300,000 barrels per day here in the country.

Senator HUMPHREY. We use about 450,000 barrels a day. About 300,000 of that is procured domestically. We get 150,000 from overseas suppliers?

Admiral RYAN. Yes, sir.

Senator HUMPHREY. How dependable are they? Who are those suppliers?

Admiral RYAN. There are a number of suppliers, sir. They are in various places in Europe.

Senator HUMPHREY. Governments or private entities?

Admiral RYAN. For the most part they are private entities. In one or two cases the source is a Government source in the form of a private entity, in other words, totally Government-owned.

Senator HUMPHREY. Are these companies affiliated at all with American companies or are they completely separate?

Admiral RYAN. Both, sir. In some cases they are affiliated, in other cases they are not affiliated except that they might be in terms of stock ownership.

Senator HUMPHREY. How reliable is that 300,000 barrels?

Admiral RYAN. Under current circumstances they are quote reliable, sir. What the reliability might be under various scenarios, of course, is a matter of some conjecture, depending upon which ones we are talking about.

Senator HUMPHREY. Has there been a report made up on that subject—classified or otherwise—reliability of our foreign suppliers in the event of conflict, say, in the Mediterranean or the Persian Gulf?

Admiral RYAN. Sir, not by my agency, but I am not prepared to say whether or not such a report has been sponsored either by the Joint Chiefs of Staff or the Department of Defense.

Senator HUMPHREY. What kinds of contracts are involved here, the time periods?

Admiral RYAN. Two kinds, sir, I would call short term and long term. The predominant form of contract is a 1-year term contract. We do, however, buy oil for the strategic petroleum reserves with the Department of Energy acting as our agent. That is crude oil, not product. That lately, for the most part, has been spot purchases.

Senator **Humphrey**. What about storage? Is there storage in the sense of having a reserve set aside that you do not ordinarily use?

Admiral **Ryan**. Yes, sir, there is a significant amount of fuel stored, product stored in various locations.

Senator **Humphrey**. For contingencies.

Admiral **Ryan**. For contingencies. You have the strategic reserves, the emergency reserves, wartime reserves I should call them. In addition to that, you have the peacetime operating stocks. The peacetime operating stocks are there, of course, for your day-to-day operations and to give you coverage so that you do not have to penetrate your strategic war reserves.

Senator **Humphrey**. So, the peacetime stocks essentially perform the function of an accumulator in hydraulics.

Admiral **Ryan**. Yes, sir, they are an additive. That is your normal operations.

Senator **Humphrey**. Are you able to talk about war reserves in open testimony?

Admiral **Ryan**. It would be very difficult to talk about war reserves in any detail, sir, in open hearings. However, in the event you wish to close, I would be happy to discuss them.

Senator **Humphrey**. Perhaps we will. I would announce at this point that I am going to have to recess the subcommittee at about 12:10 and resume at about 1 o'clock to take care of a matter I am committed to. Perhaps we will at some point go into closed testimony. Let us stay open as long as we can.

What has been the experience of your department, Mr. Secretary, with the Defense Production Act? What level of confidence do you have that the President would successfully invoke his powers under the act to obtain fuel for the Department of Defense in the quantity necessary?

For instance, if there were a conflict in the Persian Gulf and not only was oil shut off, but the operation of the Department of Defense was considerably stepped up, how much confidence do you have that invocation of the act would result in the Department of Defense getting the fuel it needs?

Mr. **Webster**. I think our confidence is much increased over the early to mid-1970's.

Senator **Humphrey**. Why is that?

Mr. **Webster**. Well, for several reasons. First of all, DOD has formed an Energy Directorate to work with all of the other Federal agencies. One of the things they have done is address this specific subject.

If we had to use the Defense Production Act, what were the mechanisms? They spent a lot of time planning. It is our estimate now that to do what we would have to do to get action from the Defense Production Act, we could probably do in a period of about 2 or 3 weeks.

In addition to that, I think because we have the Energy Directorate we are also in a better position to survey the world situation in terms of what impact energy could have on our deployments.

Also, we have gotten our fuel assurance program going full steam and we are in a better position today with prepositioned resources to get over that initial surge.

Mr. SHARKEY. Mr. Chairman, in the kind of scenario you mentioned, if there is an armed conflict going on we have very little doubt that we could get a decision to invoke the Production Act very, very quickly.

In a situation like 1979 where you were essentially at peacetime and you had the kind of scenario you mentioned earlier this morning except, we have the Strategic Petroleum Reserve, we think that is the most difficult time to invoke the DPA.

We would not want to invoke the DPA anyway because that is interfering in the marketplace through artificial allocations. But if we had to, there would be very delicate trade-offs between the economic and political side and the military.

Senator HUMPHREY. I do not know how delicate they would be, but there would be trade-offs.

Mr. SHARKEY. There certainly would. That is the purpose of the FUELEX 1981 exercise that will be playing next week. The scenario is a nonconflict scenario. From that we hope to get a decision criteria that people can use to make those kinds of decisions.

Senator HUMPHREY. Mr. Secretary, you support the President's recommendation to continue production for another 3 years. Have you given thought, has your Department given thought, to long-range plans for the Naval Petroleum Reserves? Would you be in favor, for instance, of a subsequent 3-year period of production, and what are your thoughts on continuing production until it is exhausted, essentially?

Mr. WEBSTER. Well, we do look at it constantly. I would say, yes, we are in favor of production for the next 3-year period. Then we would have to look very closely at the continuance of the SPR program as well as what is happening with some of our other programs like synfuels, which comes on board in the 1983 to 1985 timeframe.

I would say, I would have to withhold judgment on any following 3 years. I think we will be able to make some progress during this 3-year period.

Senator HUMPHREY. Supposing we were considering the proposal which I believe was made in 1976 by the House just to open up production of the naval petroleum reserves indefinitely for whatever production we could achieve, supposing that was what we were considering here, that was what was recommended, what would your testimony be? What would you say in regard to that?

Mr. WEBSTER. I do not think we have an official position on that, but I think we would still favor the recommendation to continue to have this reserve. The point in time at which we would like to shut it off is one that we have to constantly evaluate.

Senator HUMPHREY. So, that is the question. You would like to have the reserve, you do not want to see it depleted. But the question is, how much more production.

Well, then, what is the case—if you would not want to see it depleted—what is the case for having this reserve which admittedly has a poor surge capability but which, nevertheless, has the attribute of being the only source on which the Department of Defense can rely?

Mr. **Webster.** Our major case today is our fuel supply assurance program, the fact that we can use this crude to trade off to get the refined product we need, for example, the aviation fuel which is about two-thirds of our total requirment, I believe. It greatly enhances our ability to get the operational fuels and prepositioned fuel that we need.

You can imagine that in any kind of a surge requirement, it might only be the deployment of a battalion somewhere 8,000 to 12,000 miles from the continental United States, the fuel requirements—particularly in the area of jet fuel—are tremendous.

Senator **Humphrey.** So, the advantage you see at the moment is your ability to insure supply of refined products. In the event the refiners lose their source of crude you can provide them with the crude and you get the refined product in return.

Mr. **Webster.** That is correct.

Senator **Humphrey.** How many barrels per day of the production from the naval petroleum reserves are used or would be used under that scenario?

Mr. **Webster.** Of the total?

Senator **Humphrey.** Yes.

Mr. **Webster.** I believe we have 138,000 barrels a day allocated to us for this use of the total amount. This is the total Government share. Our plans are to use all of that.

Senator **Humphrey.** So, of the 180,000 barrels being produced today the Government gets, what did you say the figure was, 137,000?

Mr. **Webster.** It is 138,000.

Senator **Humphrey.** And the rest goes to private concerns.

Mr. **Webster.** Yes, Chevron.

Senator **Humphrey.** But in the event of necessity, that full 138,000—our full share, whatever it happens to be at the time—would be used to provide crude to the refiners and you would get product in return.

Mr. **Webster.** It is my understanding the President can do that.

Admiral **Ryan.** I would just add, without necessarily taking exception to the views of the Department of Energy witnesses with respect to strategic considerations, I think my perspective as commander of the Defense Fuel Supply Center obviously lends a slightly different cast to my views.

I think my principal concern, as the Secretary mentioned would be his, is the idea of a supply of product—whether it be jet fuel, or fuel for tanks, or fuel for ships—at the right time, and the right place, and the right amounts.

Armed conflict, as was earlier mentioned, would undoubtedly give rise to the use of the Defense Production Act to give me assurance of getting the adequate amount of fuel of the roughly 9 or 10 million barrels which is produced in this country, or from other secure sources such as friendly foreign nations or our strategic petroleum reserve.

But Mr. Chairman, I think if you look at past history it would strongly argue that we should be concerned about potential fuel shortages which are short of an armed conflict, such as you mentioned earlier.

From my vantage point the best response is stored fuel, not crude oil, in the correct location and of the correct types. But it could be used for only a short time before we would have to penetrate war reserve stocks. This type of penetration of the war reserve stocks actually did occur in the 1973–74 timeframe.

Short of having product in the right place at the right time, the next best response is readily and quickly available sources of product which are earmarked for the Department of Defense or supported—and supported, hopefully—by a secure crude stream.

The third-best response is crude online and readily available, and that is what an open naval petroleum reserve gives us. The idea of using that crude is to give us greater assurance of an assured product in time of need short of armed conflict.

The fourth-best response would be crude in the ground, NPR shut-in.

I think the reason to me is clear from my vantage point. It is time—and I think you mentioned it earlier, Mr. Chairman—apart from the decision time necessary to decide to open the reserve which would be 1 week, 2 weeks, or whatever it might take, you then have an additional 60 to 90 days after the decision to bring the reserves online. That, as you are going to hear later, is an arguable time period.

Then the crude must be refined or exchanged, and our best estimate is 20 to 40 days to get that kind of thing going.

Finally, the rate of withdrawal from there would be less than 200,000 barrels a day. So, from my vantage point there is no question about the fact that the ideal circumstance would be to have NPR online producing with crude which I can use in exchanging a product.

Senator HUMPHREY. Mr. Secretary, has the Department ever considered a refined product reserve, strategic reserve?

Mr. WEBSTER. A refined product?

Senator HUMPHREY. Yes.

Mr. WEBSTER. We do have war reserves as a refined product.

Senator HUMPHREY. But I mean in addition to that.

Mr. WEBSTER. Not to my knowledge; no.

Senator HUMPHREY. Mr. Secretary, what was your role in the formulation of the President's recommendation to Congress?

Mr. WEBSTER. The Office of the Secretary of Defense, being one of the major players because of our fuel utilization in the Federal Government, did formulate a position for the Secretary and that, in turn, was sent to the President. The DOD position, of course, was to continue the maximum efficient rate for the naval petroleum reserves.

Senator HUMPHREY. So, you were consulted in advance.

Mr. WEBSTER. Yes, sir.

Senator HUMPHREY. Were any of your senior uniformed personnel asked to make a recommendation to you first, Mr. Secretary?

Mr. WEBSTER. That particular recommendation was worked by the Director for Energy Policy and, of course, that directorate has an Energy Policy Council which is made up of not only the civilian but the uniformed services as well as other DOD agencies.

However, the Joint Chiefs of Staff reserve the right to formulate their own opinions on this matter, separate from the position that I would take. I think it can be made a matter of the record now that they have just made their decision to support that maximum efficient rate with some reservation.

Senator HUMPHREY. Yes. They have made a formal, written recommendation?

Mr. WEBSTER. Yes, they have.

Senator HUMPHREY. I wonder if we can obtain that.

Mr. WEBSTER. Yes.

[The information follows:]

[Information not received in time for printing.]

Senator **Humphrey.** Was that recommendation submitted before or after the President's recommendation?

Mr. **Webster.** After the President's recommendation?

Senator **Humphrey.** Was it requested before the President's recommendation? I mean, were they simply tardy? Were they asked before the President made his decision or did they submit it later?

Mr. **Webster.** I did not ask them before the President's recommendation because I had already had the Energy Policy Council consider this matter. However, I think they wanted to, separate from that, have their own consideration and did. But it was after our recommendation.

Senator **Humphrey.** Admiral Ryan, were you asked to submit a report on this, or a recommendation?

Admiral **Ryan.** No, sir.

Senator **Humphrey.** Mr. Secretary, you said that supply disruptions are extremely likely to recur in the 1980's; is that correct?

Mr. **Webster.** Yes.

Senator **Humphrey.** Extremely likely?

Mr. **Webster.** This would include local supply disruptions. By the way, we are experiencing those today throughout the world.

Senator **Humphrey.** Can you give us an example?

Mr. **Webster.** I think the area of largest interest to us right now is the Indian Ocean area where we have had, because of fires in refineries, or shipping problems, some disruptions which made us reallocate and reship considerable amounts of fuel to make up for the shortfall.

We have been and we continue, in the Southwest Asian environment, to try to procure product if we can. When those things shut down they cause us a problem with large carrier task force deployment and the associated aircraft that are with them.

Senator **Humphrey.** These pre-positioned stocks that you mention in your testimony, are these part of the war reserves?

Mr. **Webster.** Some are and some are not. Remember that we have large operating forces in both the European and the Southwest and Southeast Asia area. So we, number one, have to keep these people in a high state of readiness and training. So, the stocks are of both types.

Senator **Humphrey.** Let me ask you the question I asked of the previous witnesses. What are your thoughts on disposition or assignment of NPR in the event the Department of Energy is dissolved?

Mr. **Webster.** Well, we certainly want to follow this one very closely since we have such a large interest in the Naval Petroleum Reserves. OSD has no formal position on this, but again I would repeat what Secretary Vaughan said, that we are looking at all the alternatives ourselves. It could come back to DOD, it could go with FEMA; it could go with Commerce. I think we will have to actively consider all those and make a formal recommendation.

Senator **Humphrey.** You have no position at the moment, no strong inclination?

Mr. **Webster.** Well, as the Captain said, they are Navy people. They came from the Navy and that is where the expertise has been in force for a long period of time.

Senator **Humphrey.** Very well.

I am going to have to recess the subcommittee until 1 p.m. at which time we will have the witnesses from Chevron and the California refiners.

Would it be possible, Mr. Secretary and Admiral Ryan, for you to come back later for a closed session?

Mr. **Webster.** Yes, sir.

Senator **Humphrey.** All right, we will resume, then, at 1 p.m. I apologize for the interruption but it cannot be helped. Thank you very much, gentlemen.

Mr. **Webster.** Thank you

[Whereupon, at 12:08 p.m., the subcommittee recessed, to reconvene at 2 p.m., in room 235, Russell Senate Office Building.]

AFTERNOON SESSION

The subcommittee reconvened at 2 p.m., in room 235, Russell Senate Office Building, Senator Gordon J. Humphrey presiding.

Senator **Humphrey.** I would announce that the closed session alluded to earlier in the day unfortunately will not be held today for logistical reasons. But it is my intention, nevertheless, to have it as soon as it can be scheduled.

Our next witnes is Mr. D. T. Magee, vice president producing, exploration, and land for Chevron U.S.A.

Mr. Magee, thank you for your patience. I hope we have not inconvenienced you too much.

STATEMENT OF D. T. MAGEE, VICE PRESIDENT PRODUCING, EXPLORATION AND LAND, CHEVRON U.S.A., INC.; ACCOMPANIED BY R. A. WILBERT, MANAGER OF SUPPLY PLANNING AND COORDINATION, CHEVRON U.S.A.

Mr. **Magee.** Not at all, sir. Thank you, sir.

I am pleased to accept your invitation to participate in this hearing regarding continued production of the Naval Petroleum Reserves.

I have with me Mr. R. A. Wilbert, manager of supply planning and coordination for Chevron U.S.A. Mr. Wilbert is prepared to answer any questions which you may have in those areas.

As you know, Chevron U.S.A. is a partner with the U.S. Government in the ownership and operation of the largest Naval Petroleum Reserve, Elk Hills, NPR No. 1. Our partnership is a result of Chevron's ownership of approximately 22 percent of the lands and hydrocarbon reserves within NPR No. 1. The terms of the partnership are documented in the Unit Plan Contract which was executed by the Navy Department and Standard Oil Company of California on June 19, 1944.

This contract gave to the Federal Government absolute control over the rates and timing of production from Elk Hills. One of the stated goals of the contract is to secure the maximum ultimate recovery of hydrocarbons from the reserve.

The responsibility for achieving this goal is delegated to a two-man operating committee in which the Government and Chevron have an equal vote. Disputes are subject to resolution by the Secretary of Energy. Chevron is concerned about a loss in ultimate recovery if the field is shut in or severely curtailed. I will explain this a little later.

Elk Hills is the second largest oilfield in the United States in terms of current production, surpassed only by Prudhoe Bay in Alaska. It has total reserves of almost 1 billion barrels of oil and about 1.2 trillion cubic feet of natural gas. Current production is 175,000 barrels per day of oil, 320 million cubic feet per day of natural gas, and 15,000 barrels a day of liquid products extracted from the natural gas. Even though Elk Hills is an important domestic oilfield, its maximum output is dwarfed by the current volume of foreign oil imports and the delivery capability planned for the Strategic Petroleum Reserve by 1985.

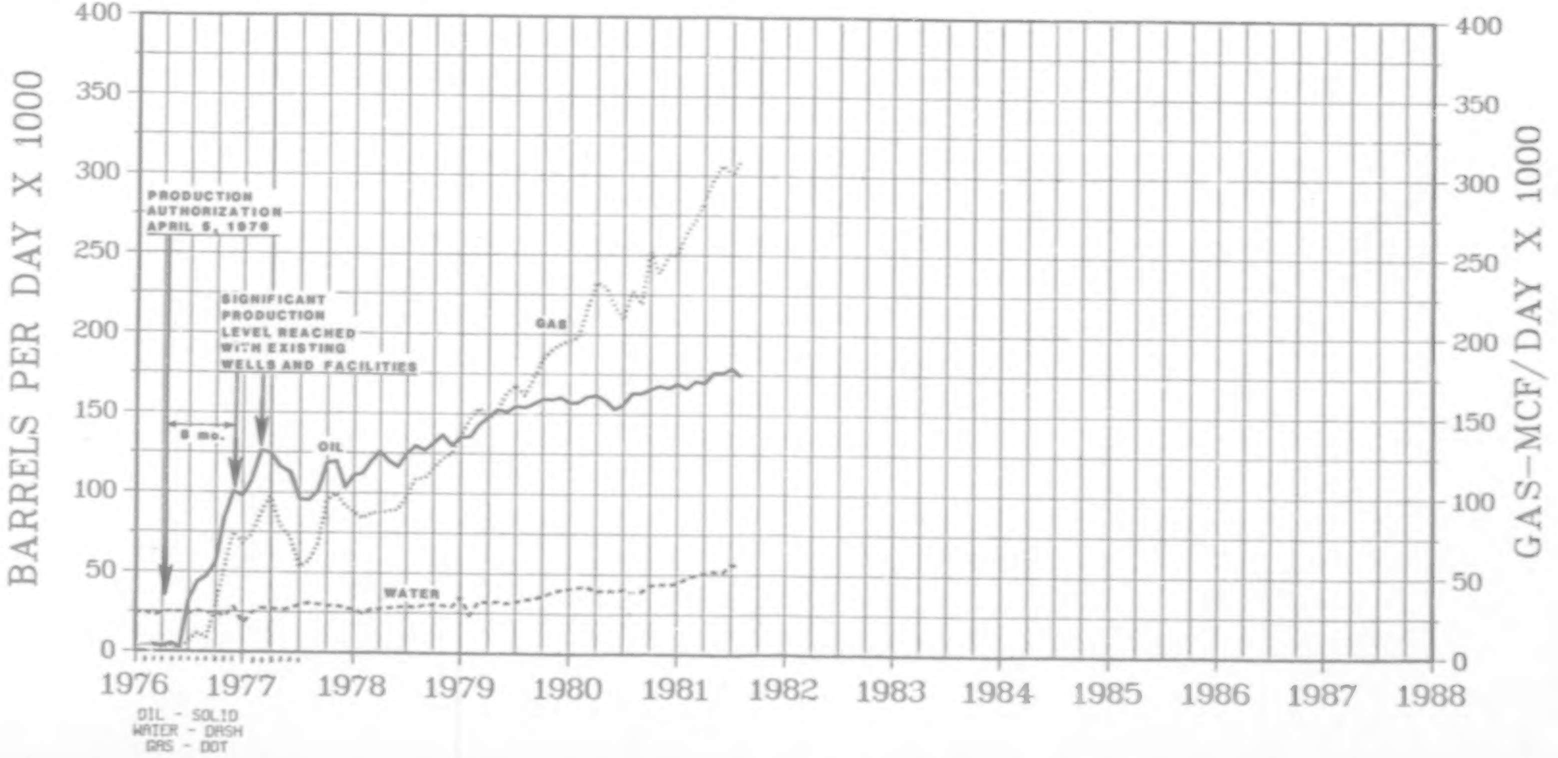
We have received and reviewed the DOE report accompanying the President's recommendation to extend for 3 years the period of maximum efficient production. We agree with the Department of Energy that continued production reduces the Nation's dependence on foreign oil imports and helps exert downward pressure on world oil prices.

We also believe that DOE is correct in its key conclusion that continued production for this 3-year period provides significant economic benefit to the United States. This benefit is estimated by them to be $4.5 billion in revenue to the Treasury for the 3-year period. Not included in this figure is about $1 billion in Federal taxes which Chevron will pay on its share of the Elk Hills production during the same period.

The DOE report compares the case of continued production with a curtailment to 25,000 barrels per day from April 1982 until late 1984 when an assumed supply disruption calls for restoring production within 60 to 90 days to a maximum "surge" rate of 192,000 barrels per day for the year 1985. Chevron is of the opinion that curtailment below approximately 50,000 to 60,000 barrels per day could result in a loss in ultimate recovery. We also believe that the "surge" rate of 192,000 barrels per day for 1 year after a shut-in period is not realistic. This is primarily due to the length of time required to restore full production, which is the most critical item from a strategic viewpoint.

The DOE estimates that full production would be realized in 60 to 90 days, yet past experience has shown that it took 8 to 11 months in 1976 to achieve significant production levels as shown on the field production chart which follows:

ELK HILLS OIL FIELD
PRODUCTION CURVE
TOTAL FIELD



Since there are now nearly twice the number of wells and three times the amount of complex surface facilities at Elk Hills than existed in 1976, Chevron is of the opinion that the restoration of full production capability would take up to 1 year or more, depending upon the state of readiness maintained during shut-in.

Even if a very costly and inefficient plan was initiated to carry out extensive maintenance and testing programs during shut-in, our experience has shown that idled wells and equipment suffer deterioration in a short time. Vital electrical systems are particularly vulnerable to the elements and major installation such as gas processing, and compressor plants are designed for continuous operation.

Cyclic testing of such facilities induces thermal and mechanical stress beyond their design criteria, resulting in equipment failure or unreliability. We, therefore, believe that "mothballing" and "demothballing" an oilfield is not a sound concept. However, with Elk Hills producing at MER during the next 3 years, this volume would be available to supplement the SPR during any emergency. Elk Hills would still contain nearly three-quarters of a billion barrels of reserves at the end of this 3-year period.

In summary, it is Chevron's conclusion that every physical and economic advantage was given to the curtailment case in the DOE analysis. The results still favored continued production at the maximum efficient rate for the next 3 years as being more in the national interest.

In addition to the broad national interest, there are other important considerations which are not addressed in the DOE report. The first of these considerations is that large volumes of Elk Hills' natural gas associated with oil production, surplus to reinjection requirements, are currently being delivered into the California market.

About 30 percent of this natural gas is delivered into utility company systems and the remaining 70 percent, or about 85 to 100 million cubic feet per day, to oil field operators who utilize this natural gas for steam generation in enhanced oil recovery projects.

There are 4 to 5 billion barrels of proven recoverable heavy oil reserves in the San Joaquin Valley. Recovery of these reserves is dependent upon steam injection to heat the underground reservoirs, allowing the oil to thin enough to flow into the producing wells. About one-half of this heavy oil is now being developed on the west side of the San Joaquin Valley, and a large and growing percentage of these reserves is dependent upon the availability of Elk Hills gas for fuel utilized in steam generation.

Due to severe California and Kern County air quality restrictions, much of the natural gas currently utilized to produce steam flood oil in the San Joaquin Valley cannot be replaced by alternate fuels.

Elk Hills natural gas sales are projected to about double over the next couple of years; and with more stringent air quality rules being promulgated, this natural gas will become increasingly important to the production of substantial volumes of otherwise unrecoverable heavy oil production in the San Joaquin Valley.

If Elks Hills natural gas sales ceased because of a severe field curtailment, industry estimates of the potential loss of current heavy oil production are in the order of 20,000 barrels per day in 1981. This represents approximately 10 percent of the current enhanced oil recovery production of the Valley, the largest steam-drive oil producing area in the world.

Over the next 3 years, an additional planned increase of over 30,000 barrels per day in this enhanced recovery oil, which is now mostly dependent on natural gas fuel, could not be developed as quickly—if at all—if Elk Hills natural gas were not available in substantial quantities. Thus, a loss of Elk Hills gas for California's enhanced oil recovery projects could result in a loss of oil production which might equal or exceed the 50,000 barrels per day "net surge" capability described in the DOE report as the main benefit of a 3-year curtailment of Elk Hills oil production.

Sir, if I may digress just a moment here to point out that while these two figures, 20,000 barrels per day currently and 30,000 next year are not very impressive, I would like to point out that the development of the heavy oil reserves on the west side of the Valley are just beginning and there is a great deal more work to do. So, this is not really indicative of the ultimate amount of oil that would be realized from the heavy reserves in that area.

Second, a severe curtailment of Elk Hills production might result in a loss of ultimate recovery. The Shallow Oil Zone which was produced extensively prior to and during World War II, as well as since 1976, is a complex series of subsurface sandstone reservoirs. Large pressure differentials exist between these reservoirs, creating the potential for oil to migrate into water and gas sands. A substantial portion of this oil is rendered unrecoverable.

This can be controlled during production periods to optimize recovery, but during shut-in it is difficult or impossible to control. The Federal Government's technical files at Elk Hills contain at least 15 official Engineering Committee reports concerning the probable loss in ultimate recovery of oil and gas during the previous shut-in years. History has shown that the preventive programs which were implemented were unfortunately not successful in preventing widely recognized migration losses.

The deeper and much larger Stevens zone was essentially unproduced until 1976, and the complex reservoirs were in equilibrium until that time. However, since 1976 about 185 million barrels have now been produced and migration problems with attendant oil recovery losses similar to the shallow oil zone seem inevitable in the event of shut-in.

Third, small local refineries supplying the vital agricultural and oil production activities in the San Joaquin Valley are highly dependent on Elk Hills crude oil. Elk Hills is particularly important to these refineries since it is a high quality crude oil which is far superior to the heavy, high-sulfur crude oils representative of most of California's production and deliveries from Alaska.

Without the Elk Hills supply, these refineries would face sizable investments and major alterations to their present operations, which would take considerable time—if feasible at all—and would result in more costly and less efficient refined product supply in the interim. Undoubtedly, some would be forced to shut down because of the lack of an economically available crude source.

The economy of Kern County benefits substantially from continued development and production of the Elk Hills field. For example, there are over 1,000 people directly employed in the field operation resulting in at least $40 million of revenues per year for the local economy. Let me say, these are good average figures but currently we would affect some 1,400 people and about $75 million flowing into the local economy. In addition, about $12 million per year in mineral and property taxes flows to the county from the Elk Hills operation.

These points all support the conclusion reached by the DOE that continued production of Elk Hills for 3 years is in the national interest. This is especially true when the strategic value of having a continuing stable supply of petroleum available for any supply emergency during the next 3 years is considered.

I thank you for the opportunity to express Chevron's views on this matter. Mr. Wilbert or I would be happy to answer any questions which you may have.

Senator HUMPHREY. Thank you, Mr. Magee.

I want to ask you something about the historical background, and I thank you for the information you provided me during the lunch break.

There was some production from the Naval Reserves during World War II, is that correct? I think I saw that here.

Mr. MAGEE. Yes, sir. The production was brought up to a high of about 65,000 barrels per day, which I think occurred during the last year or so of the war. Then, at the end of the war, production was cut back to around 2,500 to 3,000 barrels per day to meet the commitment that the Government has to our company to reimburse us for the taxes and so on, that we occur during a shut-in.

Senator HUMPHREY. Then there was no significant production between that period and 1976.

Mr. MAGEE. Just the 2,500 to 3,000 barrels a day, yes.

Senator HUMPHREY. How were Chevron and the predecessor companies prohibited from producing on land which they owned? I mean, how was their right to produce taken away?

Mr. MAGEE. Well, under the unit-plan contract which was signed during 1944, the Government has full control over the rates of production.

Senator HUMPHREY. What did Chevron get in return for that? Why would Chevron agree to that kind of proscription?

Mr. MAGEE. We received very little. We did receive some oil at an accelerated rate initially to compensate us, but it did not come anywhere near compensating us. The unit-plan contract was signed during the war when emotions were rather high and we were to some degree beaten into this unit-plan contract which we have had to live with since that time.

Senator HUMPHREY. Was it clear to the company at the time that this agreement would be perpetual?

Mr. MAGEE. Well, it was certainly clear, I am sure, to those people in the company who did sign it. But there seemed to be little choice but to do so, of course.

The full importance of the reserve early in the war was not known. The Stevens zone, which is away and by far the most prolific zone, was discovered during the war years.

Senator HUMPHREY. I see.

Mr. MAGEE. So, the real impact of signing the unit-plan contract was not really understood until it was appreciated that there was a much, much larger oil accumulation there than was known at the time.

Senator HUMPHREY. What production was there on private land within the reserve prior to World War II?

Mr. MAGEE. I think essentially none, sir.

Senator HUMPHREY. What prevented companies from producing prior to this agreement signed during the war?

Mr. MAGEE. Well, of course the Stevens zone had not been discovered and as I recall the record, the shallow zone had not been fully developed at that time. What was known of the shallow zone was essentially all on Government land.

Senator HUMPHREY. So, it did not appear attractive at the time.

Mr. MAGEE. No, sir.

Senator HUMPHREY. How do you account for the difference of professional opinion, between yourself and Captain Gilmore with respect to oil migration?

Mr. MAGEE. I just cannot understand Captain Gilmore's position on this matter, sir. As I mentioned, there are some 15 or 20 engineering studies that were made over the years on this matter, and these studies were initiated by the Operating Committee and the Engineering Committee which have joint representation on them.

I would like, with your permission, sir, to include in the record a list of these studies.

Senator HUMPHREY. Fine.

Mr. MAGEE. They are not copies of the studies, they are a list of the studies. There are 20 of them listed here and if anybody would be interested we would be glad to provide the specific studies.

Senator HUMPHREY. The list will be made part of the record.

[The document referred to follows:]

[Information not received in time for printing.]

Senator HUMPHREY. Those studies were produced by what body?

Mr. MAGEE. They were produced by a number of bodies, both under the direction of the Navy and Chevron. Many of them were done by outside consulting organizations. Some were done inhouse by Chevron. There is quite a variety.

Senator HUMPHREY. Is this a comprehensive list, or is this just a list of studies that happen to reach the conclusion that you did?

Mr. MAGEE. A table of reports relating to the loss of ultimate recovery during NPR No. 1 shut-in. They went into considerable detail in analyzing what actually took place during the shut-in of the Shallow Zone.

Senator HUMPHREY. How much of the ultimate recovery potential would be lost by virtue of shut-in?

Mr. MAGEE. Well, as you know, reservoir engineering is more an art than a science, and that is why there are some strong disagreements on some of these issues.

But we think that in the Shallow Zone there could be as much as 20-percent loss of the ultimate recoverable oil in the Shallow Zone.

In the Stevens Zone, it has not been in production nearly as long. There is quite a variety of reservoirs in the field and some would be impacted to a greater degree than others.

But it is clear that some of the reservoirs would experience loss of ultimate recovery. I would hesitate to give you a figure on that right now, sir.

Senator HUMPHREY. So then the problem of oil migration results from pressure differentials which in turn result from production; is that correct?

Mr. MAGEE. Well, what happens when you produce a reservoir, you draw down on the pressure, and when you create pressure differentials in the reservoir then you introduce the movement of water.

Senator HUMPHREY. Yes.

Mr. MAGEE. You have water pushing oil into otherwise nonoil saturated parts of the reservoir. Then you invariably lose a certain amount of oil that cannot be recovered from the newly saturated area.

Senator HUMPHREY. The more production that occurs, the greater the probability, then, of oil migration; is that correct? In other words, once you start down this path you cannot——

Mr. MAGEE. Once you start down the path, if you shut-in there is a good chance in most reservoirs that this will happen, particularly underwater drive reservoirs.

Now, it can also happen in reservoirs that have a gas cap depletion. If you deplete the gas cap in a reservoir and the oil moves up into the other previously nonoil saturated portion of the reservoir, well then you again lose the oil; it is unrecoverable oil.

Senator HUMPHREY. It moves up into the area which was formerly occupied by gas?

Mr. MAGEE. Yes.

Senator HUMPHREY. Why do you lose it in that case?

Mr. MAGEE. Well, there is a limit. You can never recover 100 percent of the oil from a reservoir physically, 10 to maybe 30 percent of residual oil is bound to occur in even the best reservoirs.

Senator HUMPHREY. Does it not become more accessible when it moves up into that gas zone?

Mr. MAGEE. No, sir; there is no physical way to reduce the oil saturation of a reservoir to zero. There is always going to be an oil saturation remaining and the degree of oil saturation remaining is dependent primarily upon the permeability and the configuration. It is to a large degree a function of the permeability of the reservoir.

Senator HUMPHREY. So, the gas is in a different kind of formation than the oil.

Mr. MAGEE. The gases can be more completely moved up than can the oil. Typically, the residual gas in a reservoir is very, very small. In oil, as I say, I am not aware of any cases where it is below 10 or 15 percent; more typically about 30 percent.

Mr. HUMPHREY. Are these reservoirs in Elk Hills much the same in that they have a pocket of gas on top of the oil?

Mr. MAGEE. There are some of the reservoirs that have gas caps on them, but for the most part they do not. The reservoirs are of quite a variety, they range all the way from good, clean sandstones to shaly sandstones, to fractured shale. Of course, they all require a different method of operation to maximize the recovery for one reason or another.

Some of them lend themselves to pressure maintenance by water flooding. In some of the reservoirs that is not suitable at all. There is gas injection into some of the gas caps going on now and plannned for the future. Some of the reservoirs do not lend themselves to any type of pressure maintenance, particularly a shale reservoir where you must let the pressure decline in order to have the oil migrate from the matrix porosity into the fractures. If you try to maintain pressure, why, you just lock the majority of the oil into the matrix porosity.

Senator HUMPHREY. I will take your word for it. [Laughter.]

The matter of how long it takes to reach full production after a shut-in. The DOE estimates under their scenario that it would take 60 to 90 days, and yet you stated that past experience has shown that it took 8 to 11 months when we first started producing in 1976.

But was that slower time, that greater time period, was that not required because we did not have the facilities in place at the time?

Mr. **Magee.** Only to a small degree. We were restricted to some degree by our ability to process the gas that would be produced along with the oil.

If you will refer to the production curve that I attached to my testimony you will see that we started just before the middle of 1976 to increase production. It was not until nearly the end of the third quarter of 1977 that we got up to somewhere near what the field was capable of.

Senator **Humphrey.** It looks like the second quarter.

Mr. **Magee.** Pardon me?

Senator **Humphrey.** It looks like the second quarter to me.

Mr. **Magee.** Yes, sir. Now, at that time there were far, far fewer wells in the field. There were 1,100 or 1,200 wells that had to be put on production and far fewer facilities.

Senator **Humphrey.** Yes.

Mr. **Magee.** Today we have almost 1,700 wells and we, as Captain Gilmore pointed out this morning, we have three very large gas processing plants. In our opinion, this is the type of equipment that does not lend itself to mothballing and demothballing. You get into all sorts of problems. There is a lot of electrical gear associated with this equipment, an awful lot of piping and so on, and there is a limit to what you can do to protect that.

As a matter of fact, mothballing in some cases would be harmful to some of the equipment because you would lock in the moisture.

Senator **Humphrey.** So, your view is that it would take longer because you would have quite a lot of equipment failure, is that it?

Mr. **Magee.** It would take so long, sir, that the emergency, I would say, in 99 percent of the cases would be all over.

Senator **Humphrey.** But what I am trying to get at is, what is the basic reason that it would take so long in view of the fact that we have more wells from which to draw?

It would seem that having more wells would permit us to start from shut-in and go to maximum efficient production much more quickly than formerly.

Mr. **Magee.** Well, to some degree it would depend upon the degree of readiness that you are prepared to finance to maintain.

Senator **Humphrey.** Yes.

Mr. **Magee.** As I said in my testimony, there are some 1,430 people involved in that operation today. Practically all of these people are nonmanagement types, these are oilfield operators, operators of one kind or another; people who know how to operate gas plants, water flood plants, how to produce oil wells.

The subcontractors in the field perform quite a variety of work of one kind or another and if you did not keep those people there, why, when it came time to open up in an emergency I do not know where they would come from because, as you know, the oil industry is at a very, very high level of activity today and they would be gobbled up the next day after they were released.

As a matter of fact, Williams Brothers, a contractor in the field, has been in position now for 4 or 5 years and they still have never filled all of the positions in their organization. You just cannot get the people.

The same has to do with the engineers in the field, on the staff of both the contractor and the Navy in the field, they cannot get the people. If the field were shut-in, why, I think 1½ years would be a very optimistic estimate of how long it would take until you get back in business.

Senator **Humphrey**. From the standpoint of finding personnel and overcoming equipment problems that are likely to occur.

Mr. **Magee**. Drilling rigs are in very, very short supply throughout the United States and particularly in California. Currently we have 7 drilling rigs and 10 or 12 work-over rigs, well-pulling rigs. If those were released they would go to other people, other companies, and they would not be available.

Senator **Humphrey**. But we have already largely drilled the area, have we not?

Mr. **Magee**. There is still a good number of wells to be drilled. The unavailability of drilling rigs would not impact the operation to open up nearly so greatly as the unavailability of work-over rigs. If you shut these wells in you are invariably going to experience difficulty in starting them again, loading up with water, whatever it might be.

Senator **Humphrey**. What was the latter kind of rig you mentioned?

Mr. **Magee**. I said well-pulling rigs or work-over type rigs.

Senator **Humphrey**. What is that?

Mr. **Magee**. Well, they are rigs that do not necessarily have the capability to drill oil wells, but they have the capability of pulling out the tubing and replacing pumps, and repairing the existing oil wells.

That is why I have considerable difficulty with this concept of surge capability. I feel that if you shut the field in that any surge would be a negative figure rather than a positive figure as the DOE and the Navy report. The day after you shut it in, if you open it up the next day, why, you will find you could not produce as much.

Senator **Humphrey**. Are there any purely gas wells in the reserve?

Mr. **Magee**. There currently is being produced what we call the shallow gas zone and it has, I think, about 65 wells in it. It produces a fairly minor amount of gas.

Senator **Humphrey**. Minor as compared with the total gas production of this field?

Mr. **Magee**. Yes, sir.

Senator **Humphrey**. What would that be, approximately?

Mr. **Magee**. The total gas production from the field is around 320 million cubic feet per day; 35 million cubic feet per day goes to fuel requirements in the field, and a large portion of it is reinjected, leaving around 85 to 100 million cubic feet per day for sale.

Senator **Humphrey**. Reinjected just for storage?

Mr. **Magee**. No, reinjected for pressure maintenance and the rest of it.

Senator **Humphrey**. Of that 320 total field production, how much is from the wells which are purely gas wells?

Mr. **Magee**. Certainly not more than 30 or 40 million.

Senator **Humphrey**. Give me the breakdown and how that 320,000 cubic feet is being disposed of today.

Mr. **Magee**. The latest report that I have shows a total gas production in the field of 320 million cubic feet; injection of 155; fuel and shrinkage, 32 million.

Senator **Humphrey**. Fuel and shrinkage, what is that?

Mr. **Magee**. Well, when you extract the liquids from the natural gas, why, you reduce the volume. In my testimony I mentioned that there are some 15,000 barrels per day of liquids.

Then our equity, Chevron's equity is about 25 million cubic feet per day. On this date there were sales of 110 million.

Senator **Humphrey**. That 110 million is the gas being sold to the producers of heavy crude?

Mr. **Magee**. To the gas company and producers of heavy crude. The gas is sold on a lottery system. Anybody, including the utility companies, is eligible to put his name in the hat and hope to get some of the gas.

Senator **Humphrey**. Speaking of these customers who have apparently become heavily reliant on gas from Elk Hills, what did they do before 1976? Did they have any supply from Elk Hills before 1976?

Mr. **Magee**. No, sir, they did not. What has happened, what has evolved over the last several years, back in the early 1970's it was fairly easy to get permits for these steam generators which at that time burned crude oil or residual.

The California Air Resources Board and the Air Pollution Control District in Kern County have turned the screws down tighter and tighter over the years. When you are able to comply with some new rule that they promulgate, then the next thing you know, you have another one facing you.

It has just evolved to the point where it is almost impossible to comply. And you cannot comply on the west side of the valley with the rules. You must burn gas otherwise you would not be in business.

Senator **Humphrey**. Supposing that supply of gas was not available, where would they get it?

Mr. **Magee**. At the moment, and this only recently became available, there is a small amount of gas available from the utility system. The reason that this is available is that they are taking some of the Elk Hills gas. But it is seasonal and is a fairly small amount, and it is very low on the interruptible scale. I think the fuel for steam generators is fourth in line. So, they would be the second user to be turned down.

I would like to correct a figure that I gave you for the Dry Gas Zone, sir. On a typical day that is 19 million cubic feet of the 322.

Senator **Humphrey**. You state that there are 4 or 5 billion barrels of proven recoverable heavy oil reserves. Over what period of time is that likely to be recovered?

Mr. **Magee**. Well, certainly, this would take you well into the 21st century. We base that on our own situation where we would expect to develop around 800 or 900 million barrels of heavy oil reserve ourselves, oh, by the mid-1990's. We represent about 20 percent of the industry in California. So, I think that the 4 or 5 billion barrels recoverable heavy oil is quite a reasonable figure.

Senator **Humphrey**. What is this agricultural use, drying of crops?

Mr. **Magee**. Well, it is drying of crops and of course California, as you know, is a very, very large agricultural State, they use fuel for tractors, cotton pickers, and trucking.

Senator HUMPHREY. Where did the refineries get their crude? Where did they get their crude before they began to get it from Elk Hills?

Mr. MAGEE. Well, I believe that they are in almost the same position as the oilfield operators, where at one time they were able to use the higher sulfur fuels than they are today. Again, the air regulations make it impossible for them to get supplies. So, they must be using the lighter, sweeter crude.

If they were forced to revert, why, then they are looking at very substantial investments in their refineries.

Senator HUMPHREY. What is your opinion of the way in which Elk Hills has been managed during this period of production? By the Government, that is.

Mr. MAGEE. Sir, I think it has been managed quite well. As you know, the Operating Committee consists of two people, a Chevron member of the Operating Committee and a Government member of the Operating Committee. I would say while we only represent overall about 22 percent of the action, I think we get our good 50 percent in when the decisions are made at the Operating Committee level.

We do have some disagreements on what the rates of production should be in some of the reservoirs, but again, reservoir engineering is an art, not a science, and there are differences of opinion. But overall, I would say quite satisfactory.

Senator HUMPHREY. These technicians and workers of various kinds are contract people, or are they your own people? How does that work?

Mr. MAGEE. Well, Williams Brothers have the contract to operate the field and provide all of the field personnel.

Senator HUMPHREY. That includes both the Government and Chevron?

Mr. MAGEE. Yes, sir. It is all operated as though it were one owner. They provide all the field people and a certain number of production engineers and people of this type who do clerical work and engineering work in the office, working up remedial programs and so on, for wells.

Now, in addition to those people there are a good number of contractors in the field over and above Williams Brothers. In addition to the drilling services—and I do not think that I need to enumerate the drilling contractors—but there is Dowell, and there is Halliburton, and B. J. Hughes, and Schlumberger, and so on, those are contractors associated with drilling operations.

Then there is a lot of maintenance and construction going on in the field still. These are oilfield construction companies, Ingersoll-Rand, service companies that provide specialized services to the field.

Senator HUMPHREY. If the Department of Energy is dissolved, what are your thoughts about where the responsibility should lie?

Mr. MAGEE. Sir, we deal principally with the people at Elk Hills and with Captain Gilmore's office. We have dealt with them both under the Department of the Navy and the Department of Energy, and it really has not impacted us greatly who they reported to.

Senator HUMPHREY. But you had a good relationship with the Navy, I take it.

Mr. MAGEE. Pardon me?

Senator HUMPHREY. You have had a good relationship with the Navy.

Mr. MAGEE. Yes, sir.

Senator HUMPHREY. I asked you earlier how well you thought the Government was doing for its part since the production began in 1976. What is your opinion of how well that resource was managed prior to production? I realize you disagreed with letting it lie, but I mean in terms of managing the resource without producing it. How well did the Government do prior to 1976, in recent years?

Mr. MAGEE. Oh, I think that it could have been managed, to some extent, better than it was. Of course, it had to be managed within what the law provided. I think that if some of the reservoirs, the Shallow Zone reservoir, if we had been able to produce it at more reasonable rates, why, we may have mitigated to some extent the ultimate recovery loss.

Senator HUMPHREY. Thank you, Mr. Magee, Mr. Wilbert. We very much appreciate your testimony and your patience.

Mr. MAGEE. Thank you very much.

Senator HUMPHREY. Our last witness is Mr. James H. Lopeman who is representing the Independent Refiners Association of California.

Mr. Lopeman, your opening statement will be inserted into the hearing record.

[The prepared statement of James H. Lopeman follows:]

PREPARED STATEMENT OF JAMES H. LOPEMAN, EXECUTIVE DIRECTOR, INDEPENDENT REFINERS' ASSOCIATION OF CALIFORNIA, INC.

CONTINUED CRUDE OIL PRODUCTION AT THE NAVAL PETROLEUM RESERVES

My name is James H. Lopeman, Executive Director of the Independent Refiners' Association of California, Inc. (IRAC). Our trade association has, since 1936, represented most of the small and independent oil refiners on the West Coast of the United States. Our eighteen member companies range in size from 4,000 to over 40,000 barrels per day of capacity and in complexity from primarily distillate and fuel refiners to others who provide a ful range of petroleum products. (Appendix I shows the membership with refinery size and location.) Western small refiners, like our counterparts elsewhere in the country, provide a valuable competitive influence in the petroleum market.

Western small refiners have historicaly been important suppliers to military and agricultural consumers as well as to the general public. For example, IRAC members have provided a variety of petroleum products, including jet fuel, gasoline, Navy special fuel oil, asphalt and other products to the following military facilities, among others: Edwards Air Force Base, China Lake Naval Weapons Center, Point Mugu Naval Air Station, Ontario International Airport (Air Force Fuel Contract), Long Beach Naval Shipyard, Norwalk Defense Fuel Support Point, Norwalk Pipeline (which distributes products throughout the West Coast), San Pedro Defense Fuel Support Point, and LeMoore Naval Air Station.

In his message of October 6, 1981, to the Congress, the President certified that continued production of crude oil from the Naval Petroleum Reserves for a period of three years is in the national interest. We strongly support the recommendation of the President and welcome the opportunity to offer to this committee our reasons for this conclusion.

Our comments will refer primarily to the NPR No. 1 at Elk Hills in Kern County, California, because of its size relative to the total Naval Petroleum Reserves and because of our more immediate familiarity with Elk Hills.

In considering the issue of continued production at Elk Hills, some background information on crude oil production and refinery supply in the region is helpful. In dramatic contrast with other regions, heavy crude oil dominates production in the area. Currently, for example, over 55 percent of production in California is 20° API gravity or less; on a national basis, heavy oil accounts for only about 5 percent of the total.

As heavy oil production has increased, there has been a long-range drop in light oil production. Since 1954 while heavy oil has doubled in production light oil production has decreased over 40 percent. More importantly without production from the Elk Hills reserve the light-crude decline would have been more than 60 percent. In fact Elk Hills crude oil represents about 70 percent of the light crude oil produced in the San Joaquin Valley region.

With these facts in mind, we offer the following reasons for our conclusion:

1. Continued production is in the national interest since shut-in would lead to increased dependence on foreign oil

Since no comparable crude oils are available in the area (as indicated earlier, comparable crudes are, in fact, decreasing in availability), refiners would look to foreign sources. The most likely source of such a replacement is Indonesia. Even if suitable crude was available from Indonesia in the volumes required (which may be questionable since their own requirements are increasing while their own production is leveling out), the upward pressure on world oil prices as a result of increased purchases by U. S. refiners would have economic impact in all regions of this country.

Much has been written and said about our national goal of reducing petroleum imports and decreasing our dependence on foreign oil. The West Coast petroleum industry has made admirable progress toward the national goal in recent years, so much so that currently less than 10 percent of crude requirements in California come from foreign sources. We believe it to be in the national interest not to reverse that trend.

2. Continued production is in the national interest since shut-in would have dramatic economic impact on the State of California and on the nation

The record already contains much information on the economic effect on the U.S. Government and the American public of a discontinuation of production at Elk Hills. Reducing treasury receipts by an estimated $2.3 billion and adding significantly to the deficit in balance of payments are particularly unwise at this time of concern for the nation's economy.

As mentioned earlier, increased purchases of foreign oil would put an upward pressure on world oil prices, affecting the cost of these supplies in all parts of the country. In California, the economic impact would be even greater.

Coastal refiners now using Elk Hills would merely have to face the increased cost of replacement crude. Refiners located inland, however, face the added problem of transporting replacement crude to remote refineries. Since no pipelines exist for flow in this direction, crude would have to be trucked to the San Joaquin Valley—at enormous expense—in order to supply local petroleum demand. An alternative would be to truck products to the San Joaquin Valley region from coastal refineries, but this option, too, carries a very high price tag.

3. Continued production is in the national interest since shut-in of Elk Hills could well cause the demise of several small refining companies

The petroleum needs of the San Joaquin Valley—for military consumers, the general public and agricultural consumer is one of the nation's most productive farm regions—are served primarily by small local refineries. As the nature and volume of local petroleum product demand has changed and as the local supply of light crudes has fallen while heavy crude supply has increased, these local refineries have made use of Elk Hills in recent years to blend refinery feedstocks suitable to today's product demands. To remove this vital feedstock may well lead to the demise of some or all of these refiners just at a time when they are adjusting to the effects of decontrol and the reduced operating margins which have resulted from slack petroleum demand.

4. Continued production is in the national interest since shut-in would reduce current and future production of domestic crude oil other than Elk Hills

Since activity there resumed in 1976, production at the Elk Hills field has been assuming an ever-increasing role in allowing increases in the production of heavy domestic crude oil. Elk Hills supports heavy oil production in three ways: it provides environmentally acceptable fuel for enhanced oil recovery, it allows refiners to process heavy oil and it allows pipelines to carry heavy oil from the San Joaquin Valley.

Enhanced oil recovery projects in the San Joaquin Valley region, which use steam generated from surplus Elk Hills natural gas to stimulate production of heavy crudes, are making a significant contribution to our national objective of increased development of domestic crude sources. Because stringent environmental regulations in Kern County and California make use of alternate fuels impossible, shut-in at Elk Hills and the curtailment of natural gas supplies at Elk Hills would markedly reduce current and projected future heavy oil production.

Many refiners in the San Joaquin Valley require a light crude oil to mix with heavy crudes to allow refinery operations. Since no comparable replacement crude is available in the area, the absence of Elk Hills crude oil would force these refiners to curtail or suspend operations, forcing reductions and/or cancellations of heavy crude purchases.

Elk Hills crude also facilitates the movement of heavy crude oil via pipeline from the San Joaquin Valley. The capacity of a petroleum pipeline is dependent on the viscosity of the product it carries. The light Elk Hills crude oil is currently being blended with heavy oil and the blend is being transported via pipeline to refining centers in the Bay Area and the Los Angeles Basin. Again, because no comparable replacement is available, the absence of Elk Hills crude would reduce the capacity of pipelines carrying crudes from the San Joaquin Valley.

5. *Continued production is in the national interest since shut-in of Elk Hills crude could be detrimental to the petroleum supply needs of the military*

The western refining industry, including small refiners, is a substantial supplier of petroleum products to the United States Government. For example, over the past ten years eleven IRAC members offered petroleum product supplies to the military. Currently, IRAC members are supplying over 163 million gallons per year of petroleum to the military, by sales through the DFSC. The products supplied by the small refiners include: JP-4, JP-5, marine diesel, motor gasoline, asphalt, Navy special fuel oils and others.

The significance of the supply from small refiners is related in many cases to their proximity to isolated military facilities, giving the military more direct access to supplies than it would have from more distant refining centers.

Without a continued supply of light crude oil, the small refiners would not be able to provide the products needed by the military. If the refining industry is decimated by the inability to continue to obtain the necessary amounts of light crude oil, the military may well feel the pinch when petroleum products are needed and their former suppliers are not available.

The Department of Defense has recognized the importance of the continuation of supply by soliciting for JP-4 jet fuel in exchange for Elk Hills crude oil.

We would also like to offer comment on the subject of exchanging Elk Hills crude oil for jet fuel, even though we realize this may not be the appropriate forum for the subject. It is our strong belief that such barter arrangements are uneconomic and inefficient and will lead to higher costs for military fuels than would be the case under alternative disposition plans. We have made our views known to the DFSC and will continue our attempts to work with them and other concerned parties to arrive at the best plan for disposition of the Government's share of NPR oil.

6. *Continued production is in the national interest since Elk Hills, in a shut-in status, has limited value as a substitute for or complement to strategic reserves*

It has been suggested that production at Elk Hills should be shut-in and the field should be held as a supplement to or substitute for other strategic reserves for use in the event of a major petroleum disruption.

We feel that such a plan is ill-advised for several reasons:

(*a*) Elk Hills is located in an area less likely to be severely disrupted by an import interruption since, as mentioned earlier, California relies less on foreign oil than do other regions.

(*b*) Transportation of Elk Hills crude oil to areas more likely to suffer import disruptions is extremely difficult because of pipeline and tanker-loading bottlenecks in California.

(*c*) In contrast with the Strategic Petroleum Reserve, which has been designed for withdrawal of large volumes of oil with minimal lead time, past experience would indicate that restaffing and demothballing Elk Hills would require considerable time, thereby reducing its value in time of crisis.

(*d*) The volume of oil available (about 175,000 barrels per day) is small in relation to the magnitude of potential supply disruptions.

In fact, it is our conviction that the best strategic use of Elk Hills for the next three years is to have it continue as a producing field. Each day's newspaper seems to bring further indication of tension in the Middle East. The nation is best equipped to face the uncertainties of the next few years with Elk Hills fully operational. To shut-in the field, to increase foreign oil purchases, to place added burden on national and regional economies, to curtail domestic oil production and to disrupt industrial, agricultural, military and consumer petroleum supplies is not only contrary to the national interest, but would be, in fact, very poor strategic planning.

We sincerely appreciate the opportunity to express our views and will be happy to answer any questions you may have.

STATEMENT OF JAMES H. LOPEMAN, EXECUTIVE DIRECTOR, INDEPENDENT REFINERS ASSOCIATION OF CALIFORNIA, INC.

Mr. LOPEMAN. We will summarize our position.

Senator HUMPHREY. Certainly.

Mr. LOPEMAN. The Independent Refiners Association of California has represented the interests of the small and independent refiners on the west coast since 1936. We have 18 member companies ranging in size from 4,000 to over 40,000 barrels a day of capacity, and from rather simple to more complex refiners.

We strongly support the decision of the President that continued production of crude from the naval petroleum reserves for the period of the next 3 years is in the national interest and we welcome the opportunity to give you the reasons for our conclusion.

Perhaps most importantly in considering this issue, it is helpful to bear in mind that in dramatic contrast with other regions, heavy crude oil dominates production in California. Over 55 percent of the crude oil produced there is heavy crude oil; the total is more like 5 percent elsewhere in the country. The situation is getting worse. As heavy oil production has been increasing, there has been a long-range drop in the production of light crude oil.

Since 1954, while heavy crude has doubled in production, light oil had decreased over 40 percent. More importantly, without Elk Hills' production that light crude decline would have been more like 60 percent.

The fact today—and we feel it is a very important fact—today Elk Hills' crude accounts for about 70 percent of the light crude oil produced in the San Joaquin Valley region in California.

So, with these points as background, then, our reasons for supporting continued production are:

First, continued production is in the national interest since shut-in would lead to increased dependence on foreign oil. One of the interesting facts with regard to the west coast is that in recent years the west coast petroleum industry has made great progress in achieving the national goal of decreased dependence, so much so that at this point less than 10 percent of the crude supplied to California refiners is foreign oil. It has been a tough battle and we feel it is strongly in the national interest not to see that trend reversed.

We also feel that continued production is in the national interest since shut-in would have a dramatic economic impact in the State of California and the Nation as a whole. You have already heard the economic effects of shutting in by reducing Treasury receipts and increasing the deficit of the balance of payments. We feel that is a course of action particularly unwise at this time.

The increased purchases of foreign oil which would be necessary since no comparable replacements are available locally would put an upward pressure on world oil prices and affect all parts of the country. In California the impact would be even greater.

The coastal refiners now using Elk Hills would merely face the increased costs of the foreign replacement oil. Our refiners located inland, however, would face the added problem of transporting the foreign crude to the remote refineries. There are no pipelines in existence to flow in that direction at this point, so the alternative would be to truck the material from the coast to the inland refineries. An alternative course would be to truck products in, but that also carries a very high price tag.

Third, we feel the continued production is in the national interest because shut-in could well cause the demise of several small refining companies. It is the small refiners who supply the petroleum requirements to the San Joaquin Valley area, the military, the general public, and for agricultural consumers in one of the Nation's most productive farm areas.

As that demand has changed and as the local supply of light crude has fallen while the production of heavy crudes has increased, these local refineries have used Elk Hills to blend a refinery feedstock suitable for today's product demands.

To remove this essential feedstock may well lead to the demise of some of these companies just at a time when they are adjusting to decontrol and to the reduced operating margins that have resulted from slack in petroleum demand.

Fourth, we feel a continued production is in the national interest since shut-in would reduce current and future production of domestic crude oils other than Elk Hills. We have just heard the gentleman from Chevron describe at some length the role that Elk Hills' natural gas plays in the enhanced oil recovery projects in the area.

I would also like to point to the fact that from a refiner's standpoint, refiners in the valley require that light crude oil to mix with heavy oils, and then that blended feedstock is suitable to go through refineries and make the products that are demanded in the area. If you take away that light crude oil it would force those refiners to curtail their purchases of the heavy crude oil. They would be unable to refine the heavy crude oil.

Fifth, we feel that continued production is in the national interest because the shut-in of Elk Hills could be detrimental to the petroleum supply needs of the military. The western refiners are substantial suppliers of petroleum to the Government. Over the past 10 years, 11 of our members have offered products to the military and currently we supply over 163 million gallons a year of petroleum to the defense fuel supply people.

In many cases the significance of the supply from the smaller refineries is related to our proximity to more isolated military facilities, giving the military more direct access to the supplies than they would have from the more distant centers. However, without a continued supply of light crude we may well not be able to provide the products needed by the military.

As you heard this morning, the Department of Defense has recognized the importance of continuation of supply by soliciting for jet fuel in exchange for Elk Hills crude oil. On that subject we would like to indicate our strong belief that a barrel-for-barrel barter arrangement of crude oil for jet fuel is uneconomic and inefficient, and may in fact lead to higher cost for military fuels than might be available through alternative plans.

We have made our views on this subject known to the DFSC people and will continue to work with them and with other concerned parties to arrive at the best plan for disposition of that oil.

Finally, it is our belief that continued production is in the national interest since Elk Hills in a shut-in status has a limited strategic value as a substitute or complement to strategic petroleum reserves. We feel that such a plan is ill-advised for several reasons.

One that has not yet been mentioned, to our knowledge, is that Elk Hills is located in an area less likely to be interrupted by an import disruption. As we have said, California is importing a very small percentage of its crude oil requirements for overseas. Elk Hills is located in an area less likely to be interrupted.

Another important point is the transportation of that Elk Hills crude to other areas more likely to be interrupted is extremely difficult. There are bottlenecks in pipelines and in tanker loading capabilities that would make it extremely difficult to move that Elk Hills oil to areas where it is likely to be needed.

You have already heard much about the capabilities of the strategic petroleum reserve with regard to short leadtime for production, the withdrawal of large volumes. You have also heard information about the size of Elk Hills relative to the need.

For all of these reasons we believe that the best strategic use of Elk Hills for the next 3 years is to have it continue as a producing field.

Each day's newspaper seems to bring further indication of tension in the Middle East. The Nation is, we feel, best equipped to face the uncertainties of the next few years with Elk Hills fully operational. To shut in the field, to increase foreign oil purchases, to place added burden on our national and regional economies, and to hamper the development of domestic crude oil production is not only contrary to our national interest, but we feel, in fact, would be very poor strategic planning.

Mr. Chirman, we appreciate the opportunity to express our views in this matter and I will be happy to answer whatever questions you might have.

Senator HUMPHREY. Thank you, Mr. Lopeman.

First, I would like to have you clarify something in your statement. On page 8, "We would like to offer a comment on the subject on exchanging Elk Hills crude oil for jet fuel." Your belief is that such barter arrangements are uneconomic and inefficient.

Will you explain that, please?

Mr. LOPEMAN. Perhaps the best way to do that is to say that in the open competitive sales of Elk Hills, which has been the predominant method of disposal since the production has been resumed, refiners have demonstrated their strong desire to have access to that crude oil by bidding bonuses and paying to the Federal Government bonuses over and above the so-called posted price of the crude oil.

The sums have been significant over the last 4 years. The bonus payments have averaged $3.50 per barrel, or an aggregate of about half a billion dollars over the 4-year period that we are talking about.

The second factor that you need to recognize again is that oil is not going to move out of the region because of transportation difficulties. It is pretty much limited to being refined within the region. Some small amount can be transported east of the Rockies, but those quantities are limited.

So, if the DFSC, particularly with regard to east coast and gulf coast requirements for jet fuel, offers to trade a barrel of jet fuel for a barrel of crude oil, that premium which straight buyers of Elk Hills crude oil have been willing to pay to the Federal Government in the past will, in effect, end up going to the barter partner. We feel that the overall economic plan is for that premium to flow directly into the Federal Government.

Senator HUMPHREY. Who are these refiners? That is, what size are these refineries the Department of Defense deals with in these barters? Are they members of your organization or are they larger refiners?

Mr. LOPEMAN. There have been both major oil companies and independent refiners who have dealt with the Department of Defense on the barter arrangements.

Senator HUMPHREY. Including small refiners?

Mr. LOPEMAN. Including small refiners, that is correct. Just for the record, as one of the witnesses this morning pointed out, there was a solicitation of a jet-fuel-for-crude-oil exchange this summer for a relatively small quantity from the Teapot Dome Reserve. Recently, the DFSC awarded jet fuel and crude oil contracts which were solicited for about 34,000 barrels a day from the Elk Hills Reserve.

The jet fuel requirements requested in that trade were primarily west coast jet fuel requirements. So, it was natural for the west coast refiners to bid on it. We feel that that particular solicitation does not have the disadvantages which we think will be the result when, as DOD indicates, they take the entire Government share at Elk Hills and attempt to trade it for fuel requirements throughout the United States.

Senator HUMPHREY. How much do your member refiners pay the Government for a barrel of crude, light crude? Are there different grades, or is it all fairly uniform?

Mr. LOPEMAN. No, there are two primary grades in the Elk Hills area, and that is the one with which we are most familiar. There is the Stevens Zone oil and the Shallow Zone oil. The prices, as you heard this morning, for those oils are—under open sales agreements—are set first by looking at the so-called posted price, which is the price offered in the market by buyers on a regular basis of crude oils in the area. So that posted price becomes one component of the price paid the Government.

Then, in the competitive bidding, interested refiners offer to pay a bonus in addition to that posted price. So, the price paid by each successful bidder will vary as the difference in his bonus bid varies to the total.

Senator HUMPHREY. But that first yardstick involves recent sales of the same grade of oil.

Mr. LOPEMAN. That is correct.

Senator HUMPHREY. The same grade of crude. Where did these refineries obtain their crude prior to 1976?

Mr. LOPEMAN. The refiners obtained their crude generally in the area. Several things, however, have changed since 1976.

First of all, as we indicated—and we cannot stress the importance of this phenomenon too greatly—the heavy oil production in the area has been increasing while at the same time, light crude oil, other than Elk Hills, has been decreasing rather dramatically.

So, prior to 1976 there were greater supplies of light crude oil available in the area, other than Elk Hills.

Second, petroleum demand in the area has increased. One indicator of that is that there has been in excess of 100,000 barrels per day of refining capacity increase in that region prior to the inception of this latest production phase of Elk Hills to today.

Also, as the gentleman from Chevron pointed out, the environmental restrictions with regard to the use of products there have changed, prior to 1976 to today.

Senator HUMPHREY. How many members are in your organization?

Mr. LOPEMAN. There are 18.

Senator HUMPHREY. Eighteen?

Mr. LOPEMAN. Yes, sir.

Senator HUMPHREY. And how many are in the vicinity of Elk Hills?

Mr. LOPEMAN. There are eight of our refiners who are intimately involved with Elk Hills.

Senator HUMPHREY. Eight. Do they have refining facilities elsewhere, or are they just in that area?

Mr. LOPEMAN. Of our members who are involved with Elk Hills, they have only the locations that are indicated.

Senator HUMPHREY. Those are their sole facilities, right in that area?

Mr. LOPEMAN. That is correct.

Senator HUMPHREY. And were any of them in existence before 1976?

Mr. LOPEMAN. By far the great majority of them were, yes, sir. If you would like for the record, I would be happy to submit the dates of inception of operations for each of those people.

Senator HUMPHREY. What source would these refiners turn to if they did not have Elk Hills crude?

Mr. LOPEMAN. By far the most likely source for the group as a whole would be foreign crudes, and specifically Indonesian crude oil would be the most likely replacement.

Perhaps a comment might be in order there. We have heard the suggestion made before that 180,000 barrels a day, or 175,000 barrels a day, is not a particularly large amount of crude oil, considering the total imports of the United States, and so on.

Indonesia would be the most likely source and there are considerable potential problems in buying that amount of oil from Indonesia. Indonesia's domestic requirements are increasing while, in fact, their production is leveling out. Some information which is in our possession tells us the Indonesians, in fact, are going to be importing by the end of the decade.

So, that one convenient source first may be very difficult to get, and second, 180,000 barrels a day of increase in demand from them will put considerable upward pressure on their pricing.

The second part of the problem is perhaps even more difficult, and that is while a coastal refiner can buy imported oil and bring it in as a substitute for Elk Hills, it does not solve the problem of the valley refiners and the petroleum demands in the valley.

Senator HUMPHREY. The Department of Defense apparently is proposing to switch from the present system of sales to some combination of sales and bartering; or is it just bartering exclusively?

Mr. LOPEMAN. The bids that have come out thus far, the format that has been used, is a back-to-back, buy-and-sell agreement. The refiner and the DFSC each agree to two contracts that are tied together.

The refiner agrees to sell a certain amount of jet fuel at a certain price, according to certain delivery terms. The Defense Department agrees to sell a certain quantity of crude oil. The pricing on the crude oil is to be at the posted price, no bonus. Thus far, at least, the bidding has been judged merely on the price of the jet fuel which the refiner is willing to offer.

Senator HUMPHREY. And how would it work if the Department of Defense went to strictly a bartering system? How would smaller refiners obtain crude?

Mr. LOPEMAN. Smaller refiners would have a great deal of trouble with it. Perhaps an example would help clarify it.

Take an east coast location for a Department of Defense requirement for fuel, Pensacola, Fla., for example. The most likely source of supply to Pensacola, Fla., is probably a refiner located somewhere in that area. That refiner, if he were to participate in the back-to-back, buy-sell arrangement or the barter arrangement as currently outlined, would probably turn around and try to make some arrangement with a California refiner, for that California refiner to actually refine the crude oil. As we said, it probably will not be transported around.

Senator HUMPHREY. Yes.

Mr. LOPEMAN. Most probably the bartering refiner would, through the exchange or sales arrangement on that crude oil, have access to the premium that that refiner in California would be willing to pay for that crude oil on a straight sale basis.

The alternative to that plan would be for the California refiner, in an attempt to enter into the barter arrangement or the back-to-back arrangement, to approach a refiner near Pensacola, Fla., and say, "Will you give me jet fuel so that I can give it to the Defense Department?"

Again, our concern through all of this is that it could perhaps not lead to the assurance of supply, the Defense Department seems to want.

Senator HUMPHREY. Very well, thank you, Mr. Lopeman, for your testimony. We appreciate your willingness to come. I assume you are based in California?

Mr. LOPEMAN. Yes, sir.

Senator HUMPHREY. At this point I would like to submit a statement by Senator Alan Cranston, who has requested that his views be included in the record.

[The prepared statement of Senator Alan Cranston follows:]

PREPARED STATEMENT OF SENATOR CRANSTON

Mr. Chairman, I appreciate the opportunity to submit my views to the Preparedness Subcommittee on the question of continuing oil production at the Elk Hills Naval Petroleum Reserve in Kern County, California.

I strongly support the Administration's recommendation to extend Elk Hills production at the maximum efficient rate [MER] for an additional three years, as the 1976 Naval Petroleum Reserve Production Act provides. Shutting down or substantially reducing production from this Reserve will have serious repercussions in California's oil producing and refining industries and in the local economy of Kern County without, in my view providing any countervailing national security benefits.

My involvement with the issue of oil production from the Elk Hills Reserve dates back to 1973. My former colleague, Senator John Tunney, and I first called on Congress to authorize production at Elk Hills during the 1973 Arab oil embargo, and again in 1975, leading to passage of the NPR Production Act as an "insurance policy" against future oil supply shortages. Since that time, the need to reduce our dependence on imported oil supplies continues, and Elk Hills production has come to play a pivotal role in California's total crude oil and petroleum product production.

Although California is the fourth largest oil- and gas-producing state in the nation and has undertaken aggressive efforts to increase production of both conventional and alternative fuels, as well as to conserve energy, the state remains heavily dependent on imported crude—particularly high quality Indonesian crude—to meet petroleum product demand. Over 50 percent of California's and virtually all of Alaska's crude is heavy, high sulphur oil which, given current piping and refining facilities, must be mixed with lighter oil to permit flow through pipelines and processing into valuable products such as gasoline and jet fuel.

Located in the heart of California's major oil producing region—the San Joaquin Valley—the Elk Hills field is not only the second largest oil producer in California but, more importantly, it is California's primary, domestic source of light, high quality crude oil. In addition to its importance for transporting San Joaquin Valley heavy oil to refineries in the Los Angeles and San Francisco Bay areas, Elk Hills oil is vital to independent refiners in Kern County. These refiners—all in business years prior to the establishment of oil controls and the entitlements system and not to be confused with the so-called "bias-baby" or "tea-kettle" refineries—are essential suppliers of petroleum products to farmers and other consumers in isolated rural markets. Because these refiners are landlocked, without access to port or pipeline facilities, it is often difficult for them to obtain at economic cost sufficient light crude from sources other than Elk Hills. Largely for this reason, a 25 percent set-aside for small, independent refiners has been employed in past public sales at Elk Hills.

While heavy oil production in the San Joaquin Valley has been steadily increasing, light production, other than Elk Hills, has declined significantly. Between 1950 and 1975 light oil production dropped from 112 million barrels per year to only 29 million barrels, a 73 percent decline. Since 1975, light production (exclusive of Elk Hills) has continued to decline and the California State Lands Commission anticipates no new major discoveries of light oil in the San Joaquin Valley area.

I know, Senator Gordon Humphrey, the subcommittee chairman, has raised the question whether this three-year extension recommendation is but the first in a line of continual requests for extending Naval Petroleum Reserve production. I don't believe this is the case. Over the next decade, the composition of California's and the Nation's oil supply will continue the present trend toward oils that are heavier and higher in sulphur. Recognizing this trend, the Nation's refining industry has already begun making the major investments in upgrading refining capacity necessary to process these heavy, sour oils into the fuels the economy demands.

Independent refiners in California want to upgrade their refineries as soon as possible to enable them to process more domestic heavy crude oil, assisting our efforts to relieve foreign dependence. Ultimately, this will relieve their dependence on Elk Hills oil. But current economic conditions prevent capitalization of the expensive retrofits needed—and in the near term, they, like most western refiners, will need at least a minimal assured supply of light crude oil to continue their operations.

In turn, the continued operation of these refineries will help to use efficiently the growing supplies of California heavy crude and accumulated residual fuel oil to supply the petroleum products needed by West Coast industry and commerce. Failure to permit these Kern County independent refiners to have access to available crude supplies they need would be a serious blow to the local communities they serve and to our efforts to obtain greater energy independence in both the near and long terms.

Natural gas from Elk Hills also contributes to the production of California heavy oil through enhanced oil recovery techniques. Because severe air pollution problems restrict the burning of crude or residual oil in steam generators for enhanced recovery, the availability of clean-burning natural gas makes possible additional heavy oil production. Currently, 20,000 barrels per day of heavy oil (10 percent of the San Joaquin Valley's total heavy oil production) is produced using gas from Elk Hills. This gas source will become increasingly important as producers' air emission offsets are used up. Over 90 percent of the gas is a concomitant of Elk Hills oil production. If one is shut off, the other will not be available.

The value of maintaining Naval Petroleum Reserve #1 as an in-the-ground reserve for national emergency uses has been questioned not only by the Department of Defense, but also by the Department of Energy, the Congressional Budget Offie and other, non-government witnesses testifying before the House or Senate on this issue. Under a near total shut-in of the Reserve, any "surge capacity" is highly uncertain. Oil production cannot be turned on and off like a spigot. If production is reduced to a minimum level of about 25,000 barrels per day, the estimated peak surge level of 250,000–300,000 barrels per day could not be reached for at least 60–90 days. Obviously our standby reserve should be able to supply much larger amounts of oil immediately in the event of a sudden shortfall. The Strategic Petroleum Reserve can fulfill this function, but Elk Hills cannot.

Priority access for the military to the SPR oil, plus the broad allocation authority provided in the Defense Production Act, would insure that the military's fuel needs will always be met in a timely manner. The Department of Defense is also—very wisely, in my view—examining plans to increase strategic stockpiles of petroleum products. And DOD has already arranged for the transfer of Elk Hills crude oil from the Department of Energy to be refined into jet fuel to meet ongoing DOD requirements.

I've consistently recommended open market sales of Elk Hills production. Moreover, the revenue generated in such sales—an estimated $4.5 billion over the next three years—can be used for the direct acquisition of oil for the Strategic Petroleum Reserve, military jet fuel purchases, or other high national priority uses. Selling the oil directly to those who need it most—and are thus ready to pay a substantial premium above average market prices—will provide maximum benefits to the federal government while helping assure Kern County independent refiners access to essential light crude supplies. It is the fairest, simplest and most economically efficient way to allocate Elk Hills oil.

In sum, I believe the nation's interest is best served by a three year extension of NPR production in this period of transition toward a heavier, more sour, crude oil supply composition. I further recommend open, competitive sales of Reserve oil, with continuation of the discretionary 25 percent set-aside for small refiners, rather than the inefficient exchange or barter systems recently employed by the Department of Energy (for SPRO) and the Department of Defense (for jet fuel).

[Subsequent to the hearing, questions were submitted by Senator Carl Levin to the Department of Energy regarding the Naval Petroleum Reserve authorization. The questions, with answers supplied, follow:]

QUESTIONS SUBMITTED BY SENATOR CARL LEVIN

SCOPE OF AUTHORIZATION BILL

Question. Mr. Vaughan, is there some special reason why we are addressing the fiscal year 1983 Authorization at this time? Why is that Authorization not broken down, either in the bill or in testimony, as is the fiscal year 1982 Authorization?

Answer. (Per conversation between Dan Hogan, Office of Naval Petroleum Reserves, and David Lyles of Senator Levin's staff on January 6, 1982, it is not required that an answer be prepared for this question as there is no indication from the transcript that Mr. Vaughan was addressing fiscal year 1983 authorization.)

USE OF FUNDS

Question. Mr. Vaughan, what use is made of funds generated by continued production from the Naval Petroleum Reserves? Do those funds wind up in a special account in the Treasury?

Answer. The revenues generated from the sale of Naval Petroleum Reserves production are deposited into Department of Treasury Miscellaneous Receipts and Windfall Profit Tax accounts. The receipts do not offset any specific program. The receipts do, of course, reduce the size of the overall Federal budget deficit and help finance the entire budget.

PURPOSE OF NAVAL PETROLEUM RESERVES

Question. Mr. Vaughan, what was the original purpose in establishing the Naval Petroluem Reserves? Did the Naval Petroleum Reserve Production Act of 1976 reflect a change in that purpose? Does your proposal to continue production from the Reserves at the maximum efficient rate reflect the original purpose for which the Reserves were established? What has changed things so, as you say in your prepared statement, "there is no need to shut-in an oil field to provide for Defense needs?"

Answer. A series of Executive Orders issued between 1912 and 1923 established four petroleum reserves for use by the Navy as an emergency source of liquid fuels. During World War II, Reserves No. 1 and 3 were produced in order to supply limited amounts of petroleum for national defense needs. At the end of the War, these reserves were shut in and the petroleum was conserved to meet future national defense requirements.

In 1976, the Naval Petroleum Reserves Production Act (P.L. 94-258) was enacted. The Act called for production at the maximum efficient rate for six years to provide for ". . . essential defense, industrial and military emergency energy requirements relative to the national safety, welfare and economy, particularly resulting from foreign military or economic actions." That law also transferred administration of NPR-4 in Alaska to the Department of Interior. It also provided for extension of the production period for additional periods of three years each, if the President determined such production was "in the national interest," and neither House of Congress disapproved continued production.

Continued production of the Reserves is consistent both with their original purpose and the expanded mission specified in the 1976 law. It is consistent with their original purpose because at least part of all the Government's share of oil produced from the petroleum Reserves after April 4, 1982, will be sold to the Department of Defense. DOD will link disposition of this crude oil with the acquisition of refined products such as jet fuel and marine diesel through a competitive bid process open to all potential buyers, without restrictions. The oil is expected to provide a substantial portion of the DOD petroleum requirements and help to insulate our armed forces against the adverse impacts of petroleum shortages. It is also consistent with the 1976 law because we believe continued production of the Reserves and the generation of substantial revenues to reduce budget deficits is in the broader national interest.

ALLOCATION OF PRESENT AND FUTURE RESERVE PRODUCTION

Question. Mr. Vaughn, how is the oil produced from the Naval Petroleum Reserves currently being allocated? How much of the daily production is being used to fill the Strategic Petroleum Reserve? How much is going to the Department of Defense? Will these allocations change if the three-year extension is approved? If so, how will they change? Have you considered the impact on small refiners of changes in current allocations? Do you plan any set-aside for small refiners in the future? If not, why not?

Answer. The Naval Petroleum Reserves are currently producing about 180,000 barrels of oil per day. The present allocation of that oil, pursuant to sales and transfers effective December 1, 1981, is as follows:

Reserve	Disposition (BOPD)	Production (BOPD)
No. 1:		
Open market sales	92,000	174,000
DOD	23,500	
Chevron [1]	58,500	
No. 2:		
Lessees	1,967	2,100
Open market sales	133	
No. 3: DOD	3,500	3,500
Total	179,600	179,600

[1] Includes ownership share (38,500) plus balancing for new land brought into the unit contract (20,000).

You will note that none of our current production is allocated for the purpose of filling the Strategic Petroleum Reserve. For the year ending November 1, 1981, however, 36.7 million barrels of oil were delivered to companies which in turn, delivered approximately the same quantity of oil to the Strategic Petroleum Reserve. While that process appeared to be the most attractive option for resuming fill in 1979, which had been interrupted as a result of the Iranian revolution, oil supplies were more plentiful over the past year making purchase of oil on the open market for the SPR more cost efficient. We are transferring some oil from NPR-1 directly to the Strategic Petroleum Reserve on a limited basis.

DOE has no plans for a small refiner set-aside. Like other refiners in the area of the Naval Petroleum Reserves, they will have an equal opportunity to bid on contracts solicited by DOD to refine the crude oil and, in fact, four of the six successful bidders in DTD's last solicitation were small refiners.

ALTERNATIVES CONSIDERED

Question. Mr. Vaughn, were the production alternatives discussed in the DOE report—shut-in to 28,000 barrels per day production level or continued production at the maximum efficient rate—the only alternatives considered in the DOE's study? If not, what other alternatives were examined? Why were they rejected? What were the detailed reasons why the recommendation of the DOE Office of Naval Petroleum and Oil Shale Reserves—the shut-in level of production—was rejected by the Secretary of Energy?

Answer. The whole range of production levels was considered in the early analysis of this study. It was concluded, however, that virtually any intermediate level between the maximum efficient rate and a level which would reduce production to the minimum that would still maintain Elk Hills so that it could be returned rapidly to maximum production, would be suboptimum. The production issue hinged primarily on two factor of national interest: strategic petroleum requirements and economics. Any production above the 25,000 to 30,000 BOPD level reduced the limited strategic value obtained from shut-in; any production at less than the maximum efficient rate reduced the economic value.

There were several reasons for recommending to the President continued production of the petroleum reserves at the maximum efficient rate. First, it was determined that the modest estimated value of NPR–1 as an emergency supplement to the Strategic Petroleum Reserve during a petroleum shortage would be less than the costs incurred from deferred revenue and the adverse effect on gross national product, even if it were certain that a world oil supply interruption of six million barrels per day would occur for the full calendar year 1985. Simply stated, the SPR is a better emergency reserve than the NPR's.

This is due in large part because only a limited portion of the oil "shut-in" during periods of reduced production could be produced rapily in large volumes during an emergency. Furthermore, the short term surge capability of NPR–1 is small when compared with the Strategic Petroleum Reserve which can drawdown and distribute 1.7 million barrels per day now, increasing to about 3.0 million barrels per day in 1985.

As you can appreciate, it is not at all unusual for recommendations of particular program offices to be reviewed in the course of developing a policy recommendation. In the course of the review, the issue is typically seen in the broader context. In the case of the NPR's, when shut-in was compared with other ways of providing for security and economic benefits, the desirability of continued production and the drawbacks of shut-in became clear.

Other economic considerations included the likely adverse effect which reduced production would have on domestic oil import levels, world oil prices, the U.S. balance of payments, and the Federal budget deficit. In addition, the local area impact analysis indicated that reduced production from NPR–1 would adversely affect local refineries by accelerating the need for substantial economic investments in order to process increasingly heavier crude oils.

Our recommendations were given further weight by Department of Defense endorsements based on their need for assured sources of petroleum supplies.

GENERAL ACCOUNTING OFFICE REPORT

Question. Mr. Vaughan, have you seen and read the October 26, 1981, General Accounting Office (GAO) Report on the question of continued production at Elk Hills? The GAO Report discusses a number of options, including open market sales of Elk Hills oil or production at some appreciable level, but less than the maximum efficient rate. Please comment for the record on each of these options. I am especially interested in your thoughts on production at some appreciable level which is less than the maximum efficient rate.

Answer. Yes, I have read the Report, and I would be pleased to comment on the four options presented in that Report.

Option 1: Near total shut-in (about 8,000 BOPD).

This option was rejected for two primary reasons. First, contractual commitments exist with Chevron U.S.A., a part owner of the Elk Hills Reserve. Under the terms of the unit contract, Chevron would be permitted to continue lifting a portion of its share of the oil underlying NPR–1, and amounting to about 20,000 BOPD, for a period of eighteen months. Second, a reduction in operations to the 8,000 BOPD level would require that many of the production and processing facilities be mothballed. This would substantially reduce the readiness of this Reserve to respond to a petroleum shortfall emergency.

Option 2: Partial shut-in (about 28,000 BOPD).

This option was rejected for the following reasons: a) the limited strategic value offered by shutting in the Reserve; b) economic considerations including the adverse effects on the U.S. oil import bill, world oil prices, the federal budget deficit and the gross national product; c) the adverse impact on local petroleum refining and enhanced oil recovery activities in California; and d) the request by the Department of Defense to provide them with the maximum amount of oil available to support their assured supply program.

Option 3: Full or near full production with DOD allocation and no small refiner set-aside.

This is the option selected by the Administration. This option provides dual benefits of avoiding the adverse economic impacts associated with shutting in the Reserve and providing the Department of Defense with a significant portion of their domestic petroleum supply requirements. I would like to briefly address the concerns raised by the General Accounting Office about this option.

A concern is raised that the Reserve will be depleted quickly. While it is true that production rates will steadily decline, the Reserve contains over 900 million barrels of oil and will continue production into the next century. A related concern is that the Reserve will be depleted in peacetime and then be unavailable for emergency situations, especially DOD needs. The DOD has testified that their peacetime and emergency needs could best be met by continuing production at the maximum efficient rate. This allows DOD to put in place their assured supply program and would ensure that the oil was already flowing (to them) in the event of an emergency. I would also support this line of reasoning as it assures maximum output from the Reserve, for normal or emergency conditions, during a period when we plan to fill the Strategic Petroleum Reserve to substantial levels. Another concern is about the inability of small refiners to compete for NPR-1 oil if it is all allocated to the Defense Department. Experience with the allocations of oil to DOD during 1981 has shown that small refiners can compete successfully as refiners for that oil which DOD makes available through competitive bidding to all potential purchasers without restriction or preferential treatment.

Option 4: Full or near full production with continued 100,000 BOPD SPR exchange, and DOD emergency access, along with remaining federal production available for small refiner allocation.

The key element of this option is the proposal to continue the exchange program conducted with the Strategic Petroleum Reserve. Under that program, during the year from November 1, 1980, to November 1, 1981, some 36.7 million barrels of NPR-1 oil were delivered to companies which in turn delivered equal amounts to the SPR storage sites. (Direct transfer of the NPR-1 oil to SPR storage was not feasible at that time because of transportation constraints.) While that program was attractive under conditions for that period, the past year's availabiliy of oil on the open market made direct purchases of oil from the marketplace more economically efficient and attractive in most cases.

Regarding the suggestion to produce the Reserve at something less than the maximum efficient rate, there are simply no large payoffs to be gained from that approach. Any production less than the maximum reduces the benefits to be obtained from continuing such production.

ASSUMPTION RE: WORLD OIL PRICES

Question. Mr. Vaughan, the DOE report indicates that DOE's calculations of the impact of cutting back on Reserve production on world oil prices are "highly uncertain." How are those calculations affected by the October 29 OPEC oil pricing decisions? Do you believe those pricing decisions will inject greater stability into oil pricing over the next year? How does this greater stability impact your conclusions on continued production from the Naval Petroleum Reserves?

Answer. The uncertainty about how much of an effect reducing NPR production will have on world oil prices is influenced by unstable prices attributed to the current supply situation, and the degree of responsiveness of demand to a rise in prices caused by a reduction in supply. The recent OPEC price agreement and the apparent willingness of OPEC members, such as Saudi Arabia, to cutback production, could reduce any oversupply that may exist and contribute to greater price stability. As prices stabilize and demand and supply again approach equilibrium, our estimates of the impact on world oil prices of reducing NPR production become more certain.

It is important to note that during any period, the demand for and supply of oil determine its price. Whether demand and supply are in equilibrium and prices are stable, or demand and supply are changing and prices are unstable—

the effect on prices of a reduction in supply will be much the same. Either a reduction in supply will bring about an almost immediate price increase, or a reduction in supply will put upward pressure on prices which will be reflected in higher overall price levels once equilibrium is restored. If NPR production were to be reduced, some pressure would be felt in the marketplace to increase oil prices to a higher level than would have prevailed if NPR production had continued at the maximum efficient rate. Estimating the precise price effect of a reduction in supply always involves some uncertainty; however, we believe our estimates adequately account for this uncertainty and strongly support the conclusions of our previous analysis.

IMPACT OF SHUT-IN POLICY ON MAXIMUM EFFECTIVE PRODUCTION RATE

Question. Mr. Vaughan, what would the maximum effective rate of production at Elk Hills be in 1985 if we shut-in production over the next three years to a 28,000 barrel per day level? What would that rate of production be in 1985 if we continue present production policies for the next three years? How many barrels of reserves would remain at Elk Hills by 1985 under both assumptions—shut-in level versus continued production at maximum efficient rate?

Answer. The maximum efficient rate of production from any oil field is principally affected by the number of producing wells and the amount of recoverable oil remaining in the reservoir. As the result of an aggressive drilling program over the past seven years, production at NPR–1, Elk Hills, has risen dramatically from about 3,000 BOPD prior to open-up in 1976 to an average of 171,400 BOPD in 1981. The production rate at Elk Hills has now peaked, however, and will steadily decline as the field continues to produce. It is projected, for example, that under continued production the maximum efficient rate in 1985 will have declined to around 140,000 barrels of oil per day. If the reserve were to be shut-in until that time while development drilling and well workover activities continued, it is estimated that Elk Hills could resume production in 1985 at 197,000 barrels of oil per day and sustain that level for a year. After that time, the production rate would decline.

At the end of fiscal year 1981, it is estimated that remaining recoverable oil reserves at Elk Hills were 926 million barrels. If production there is continued at the maximum efficient rate, those reserves will decline to about 750 million barrels by 1985. If production were reduced to a 28,000 barrel per day level until 1985, 895 million barrels would be in place at that time.

OTHER NAVAL PETROLEUM RESERVES

Question. Mr. Vaughan, are there any plans to establish additional Naval Petroleum Reserves?

Answer. No. We have no plans to establish additional Naval Petroleum Reserves.

STRATEGIC PETROLEUM RESERVE

Question. Mr. Vaughan, does this Administration view the Strategic Petroleum Reserve as essentially a replacement for the Naval Petroleum Reserves? What are the Administration's current plans for filling the Strategic Petroleum Reserve? How much oil do we plan to have in that Reserve by 1985? How will oil for that Reserve be acquired over the next three years?

Answer. The Naval Petroleum Reserves complement the Strategic Petroleum Reserve; neither reserve is considered as a "replacement" for the other. The Strategic Petroleum Reserve is our Nation's primary emergency oil stockpile and is much better suited for responding to a major oil supply emergency than the Naval Petroleum Reserves in terms of proximity to the pipeline transportation network and far superior drawdown capability.

The Administration's policy is to fill the Strategic Petroleum Reserve to the level of available storage capacity, now projected to be 267 million barrels at the end of fiscal year 1982, increasing to 456 million barrels at the end of fiscal year 1985. Thus, we would anticipate the delivery of 189 million barrels during fiscal year 1983 through fiscal year 1985. As of January 4, 1982, the Strategic Petroleum Reserve oil inventory was 230.3 million barrels, an increase of 31 million barrels since October 1, 1981, representing an average daily fill rate of over 320,000 barrels during the first quarter of fiscal year 1982.

Senator HUMPHREY. Again I emphasize my intention of having, as soon as possible, a closed hearing on this same subject. Thank you all.

The subcommittee will stand adjourned subject to the call of the Chair.

[Whereupon, at 3:05 p.m., the subcommittee adjourned, to reconvene subject to the call of the Chair.]

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